

COMPUTER WORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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Mad at UPC

With its latest issue, *Mad* magazine came out strongly against the Universal Product Code (UPC). The reason? Aesthetic, not technical — or, as only *Mad* could describe it, the UPC looks "yecchy." (Used with permission of *Mad* magazine, copyright 1978 by E.C. Publications, Inc.)

Two Software Houses Back Use of Electronic Messaging

By Don Leavitt
CW Staff

While the U.S. Postal Service and other government agencies are generally considering tests of electronic mail [CW Feb. 27], at least two software houses have brought out packages specifically designed to support the electronic preparation, switching and receipt of messages.

The environments in which these recently introduced products operate are dramatically different indicating the implementation of such systems may be limited only by the capabilities of the designer.

The Computer Message Transmission (Comet) package from Computer Corp. of America (CCA), for example, is based on the PDP-11 minicomputer from Digital Equipment Corp. utilizing standard DEC software. The Messenger system from On-Line Software International (OSI), on the other hand,

runs on IBM 360s and 370s under the Customer Information Control System (CICS) communications monitor. (Continued on Page 8)

GAO Auditors Demonstrate SSA Data Too Easy to Steal

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — General Accounting Office (GAO) auditors recently removed 39 reels of magnetic tape containing the names and addresses of 114 million Americans from the Social Security Administration's (SSA) central computer facility — without a blink of a security guard's eye.

A \$500,000 security system was installed in the last few months at the fa-

IBM Planning to Open Chain of Retail Stores To Sell Small Systems?

By Jeffrey Beeler
CW Staff

BOSTON — IBM is apparently testing the feasibility of opening a retail store chain to distribute its small business systems.

Company officials, however, last week denied that goal prompted the firm to begin creating a series of demonstration centers in January for its newly introduced 5110. They dismissed speculation that the appearance of the centers, located at existing IBM offices in 22 major U.S. cities, heralds a major change in the company's distribution methods.

The IBM officials also stressed that IBM has long operated demonstration centers for systems other than the 5110 and that the latest ones were created for the same reason as their

predecessors: to demonstrate the capabilities of the company's equipment and to provide prospective users with technical information.

But the demonstration centers for the 5110 differ in some respects from IBM's earlier facilities. In fact, at times they smack less of a typical demonstration center than a conventional retail outlet.

Unlike the company's earlier centers, where interested parties usually met with IBM representatives by appointment only, the facilities for the 5110 are continuously manned on weekdays to accommodate prospective customers who can and often do request unscheduled equipment demonstrations.

Unlike their predecessors, the latest (Continued on Page 5)

Ex-IBMer Wanted to Testify IBM Broke Consent Decree

By E. Drake Lundell Jr.
CW Staff

SAN FRANCISCO — A former IBM employee was prepared to tell the jury hearing the Memorex vs. IBM antitrust case here that he told management of IBM's disk drive facility some of the firm's pricing actions violated the 1956 consent decree against the firm and IBM's own code of business practice.

But the jury never got to hear that testimony because Judge Samuel Conti determined the employee was too far down the corporate ladder — even though Conti admitted a statement like this could very well be the statement that swings the whole case in the eyes of that jury.

However, the witness testified that management at IBM's disk drive facility in San Jose, Calif., was aware IBM's actions were designed to drive competitors out of business.

Brian Cunningham, an IBM employee from 1966 to 1972 and presently a lawyer in Gilroy, Calif., would have told the jury that he informed his boss that IBM's pricing actions in the disk area clearly violated the 1956 consent decree. Memorex lawyers told the judge. He was also prepared, the law firm said, to testify that his boss' answer was: "Look we can conceal it and we can get legal guidance."

And the answer I do think is significant. Your Honor, when the man says we can get it by legal, in effect the man is saying we can camouflage our price cut and we can sneak it by the legal department. — a Memorex attorney continued.

Conti refused to allow the Memorex attorneys to question Cunningham about the consent decree because he held that Cunningham did not have responsibility for administering the consent decree and was therefore not in a position to speak for the corporation.

However, the Memorex attorneys argued that it was part of every IBM employee's job to read the internal IBM code of business practice — which contained the consent decree — and that Cunningham had almost completed his legal education at the time he objected to the practices.

(Continued on Page 6)



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Sparks Protest From Moss

FBI RFP Includes Message Switch

By Edith Holmes

CW Washington Bureau

WASHINGTON, D.C. — The Federal Bureau of Investigation has issued a request for proposals (RFP) for a telecommunications system that would allow message switching between state and local law enforcement agencies, and a California congressman is protesting.

Democrat John E. Moss made the RFP public last week when he wrote to U.S. Attorney General Griffin B. Bell asking that the Justice Department curb the FBI's flirtation with message switching by withdrawing or revoking the RFP.

The RFP asks vendors to include a message-switching option in the event Congress decides its benefits outweigh its risks to civil liberties and individual privacy.

Issued in mid-December, allegedly with the blessing of the General Services Administration (GSA), the FBI's RFP calls for between \$1 million and \$2 million to be spent on two mini-computers — one to act as a backup — to serve as the communications processors for the Bureau's National Crime Information Center (NCIC).

The RFP supplements two previous RFP requests for procurement authority from GSA to acquire 40 cluster terminal sets and 60 data terminals. These requests were made last October.

Double Message Seen

Rep. Moss and Sen. James Abourezk (D-S.D.) last week protested the fact that the FBI had issued the RFP for communications controllers and made earlier requests for terminals to provide message switching at the same time the Justice Department and the White House assured the members of

Congress no final decisions had been made with regard to NCIC message switching and none would be made without prior consultation with and approval by the Congress.

Moss has yet to receive an answer from the attorney general. At his Senate confirmation hearings for the post of deputy attorney general, however, Benjamin R. Civiletti said, "The Justice Department's position is what it has always been. There will be no FBI message switching without full confirmation by the House and Senate committees concerned with the bureau."

The congressmen has also asked the GSA to withdraw the go-ahead it gave the FBI for acquiring the minicomputers. Sources close to the GSA said the agency is "moving in that direction, but hasn't decided whether to revoke its original OK. GSA Computer Commissioner Frank Carr continued the FBI did not follow his guidelines in issuing the RFP.

Option Only

The FBI maintained last week its RFP was proper because it informed prospective vendors that while it wanted to see the message-switching capability included in any proposals as an option, the bureau did not yet have authority to install message switching.

Seeking to replace its own two IBM 2703 communications controllers with minis providing increased line capability and flexibility, the FBI noted in its RFP: At the time of this solicitation there is under consideration a proposal to add a limited message-switching capability to the NCIC system. If implemented, this capability would enable individual users to send messages directly to other users via the NCIC network.

In order to allow for this possible enhancement, bidders will be required to offer, as an optional feature, the hardware and software components necessary for message switching," the proposal request said.

Critics of the NCIC, however, have asked for a full evaluation of the system that would examine whether the FBI should be in the business of message switching at all (see story on Page 9). They fear FBI message switching would create a national data bank of instantaneously available information, thus turning the bureau into a national police force.

The procurement, now, of a message-switching capability would make the eventual operation of such a system by the FBI that much more probable by foreclosing other options, the critics suggested.

And that is just what the FBI intended with its RFP, bureau sources said. Officials within the FBI's Technical Services Division deliberately tried to keep the real intent of the RFP from the House Subcommittee on Civil and Constitutional Rights, which oversees the bureau, the sources stated. In its RFP for minicomputers and its request for terminals, the FBI sought to acquire communications processors to interface with a total of four IBM 360/65s and as many as 240 communications lines.

In October, the bureau asked the GSA to "immediately" procure 20 Teletype Corp. Model 40/40 Tempest mini cluster terminal sets and 20 Tempest mini cluster terminal configurations. At a total cost of \$484,930, the bureau management of up to 18 major FBI cases by the end of 1978.

On the Inside This Week

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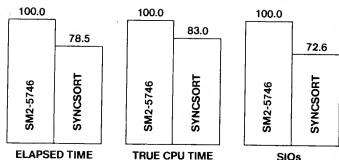
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How time flies! Just a few years ago, SyncSort for OS and OS/VS was an unknown young understudy to the then reigning *Diva* of the day, a slightly overweight IBM sort. Would our promising young protégé ever get the big break she needed?

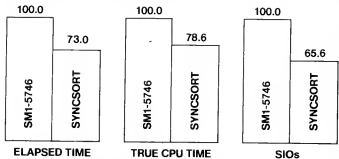
We decided to help make that happen. We set up a series of exhaustive "auditions" that matched SyncSort against the Lady from IBM in every role in the sorting repertory.

The rest, of course, is history. When word began to spread around the circuit that SyncSort simply did more sorting work at less cost in machine and human resources, the sorting public began to queue up. Today, SyncSort plays the top role in over half of all OS and OS/VS installations. But what about SyncSort DOS and DOS/VS? Would it have that kind of success against all that competition from IBM? We decided to bite the bullet and find out.

First we tested DOS/VS against the Computer Giant's leading lady, which happens to be SM2-5746 — the "top of the line" sort for DOS/VS. Well, it came as quite a shock to us, but the "top of the line" is apparently not that high. Because SyncSort did a lot more sorting, for a lot fewer resources, in every single category:



Okay, we thought, maybe we made a mistake. Maybe SM2 isn't the best the Giant has to offer. So we took a look at SM1-5746. Here are the results:



Yes, we did a full matrix of tests against all those other IBM sorts for DOS and DOS/VS — the whole thundering herd of them. (Think *quality*, IBM, not *quantity*!) But the results were just more of the same. Our test crew said it was like being trapped on a down escalator.

So we think we may have another winning sort on our hands, and we think you'll think so, too. Particularly if you like talented performers, with trim lines and no horns on their heads.



WHITLOW

COMPUTER SYSTEMS Inc. 560 Sylvan Ave., Englewood Cliffs, N.J. 07632

IBM 3270-Compatible Units Star at Interface 78

By Ronald A. Frank
CW Staff

LAS VEGAS — CRT systems compatible with the IBM 3270 led the terminal products introduced at the Interface 78 conference here last week.

Memorex Corp. introduced two controllers and a line impact printer for use with its 1377 CRT terminal. The 1371 remote controller and 1372 local controller were described as interchangeable with the IBM 3271 and 3272 control units.

Each controls up to 32 devices, which can be a mix of CRTs and printers, to configure a 3270-compatible system that can be attached to IBM 360, 370 or System/3 CPUs. Memorex said.

Also introduced was the Model 2089 printer, which Memorex said is functionally equivalent to the IBM 3288 and 3289 printers. The 2089 is also interface-compatible and software-compatible with the IBM 3284 and 3286 printers, the firm said.

The printer uses a flexible print belt with individually replaceable slugs and operates at speeds up to 410 lines/min. The 2089 costs \$8,000 or \$209/mo on a two-year lease.

The 1371 remote controller configured for an eight-terminal system costs \$6,050 or \$190/mo on a two-year lease. The 1372 is priced at \$207/mo or \$6,800 for an eight-terminal local mode system. Device adapters for eight additional lines cost \$779 or \$53/mo.

Raytheon Data Systems Co. upgraded its PTS-1200 CRT terminal

system with the Mark I and Mark II configurations. The Mark I includes a processor with 64K bytes of main memory and a 10M-byte disk storage system. Up to eight CRTs can be supported with various printers, tape drives and card readers, according to a spokesman.

The Mark II supports both binary synchronous and IBM's Synchronous Data Link Control (SDLC) protocols and includes IBM 3270 emulation. A typical four-terminal system costs less than \$850/mo on a three-year lease, the spokesman said.

The Mark II supports up to 24 CRTs and has a processor that includes 128K bytes of storage. The system handles up to 20 I/O device connections in addition to the terminals, including the 600 line/min Model 3306 printer, 60M-byte storage module and Model 3410 magnetic tape transport, the firm said. The Model 3306 printer costs \$23,489 with controller or \$490/mo on a three-year lease. The Model 3820 costs \$35,000 or \$709/mo while the 3410 is priced at \$23,000 or \$750/mo.

The Mark II also handles bisynchronous and SDLC protocols; a typical terminal system leases for \$2,625/mo on a three-year basis.

The SDLC capabilities introduced for the Mark I and II support batch and interactive transmissions on a phone line. Package net software called DMEP II and Raypak will be added, Raytheon said, to allow the PTS-1200 to operate under the X.25 protocol on existing and planned public packet

data networks.

Raytheon also introduced a downline terminal control feature that allows a PTS-1200 system to monitor and control Raytheon CRT nets running under 3270 protocols. A Teletype concentrator is said to allow users of large teletype nets to consolidate message traffic on PTS-1200 phone lines, the company said.

Other software for the PTS-1200 includes an enhanced editor for use of IBM TSO functions, a downline program loading routine and a remote debug feature for program patching of software routines.

TI Smart System

Texas Instruments, Inc. showed its 774/1 intelligent terminal system and debuted software for the 990 processor family. The 774/1 was designed for data entry and inquiry/response applications in distributed processing nets. The CRT-based system uses diskette storage and an extended version of the TTL 700 programming language.

IBM 3740 and teletypewriter emulation packages are available on the CRT system, a spokesman noted.

A hardware configuration of the 774/1 includes a 64K-byte processor, CRT, dual diskettes and two communications ports. This system costs \$12,950. A basic software version is also priced at \$12,950.

TI also added RPG-II software to its D5990 systems and an IBM 3780 emulator to the F5990 and the D5990 systems. An entry-level D5990 system with RPG-II costs about \$29,900, the company said.

Tektronix Showings

Tektronix, Inc. showed its 4020 series of CRT terminals that includes the 4025 and 4024 terminals, designed that includes 4025 and 4024. The terminals, designed for the alphanumeric user who needs graphics capabilities, can copy up to 53 lines of screen information using the 4631 hard copy unit.

The 4024 with alphanumeric capabilities costs \$2,995; the 4025, with combined graphics and alphanumeric features, is priced at \$3,595.

Digi-Lug Systems, Inc. of Horsham, Pa., introduced an upgraded version of its Microterm II terminal with Isam file control software and increased diskette storage. The intelligent terminal costs \$7,500.

Teletype International of Salt Lake City introduced its B152 CRT with detachable keyboard. The unit costs \$1,595.

Beehive also unveiled its B160 CRT, designed to interface with Admim's netware and the Digital Equipment Corp. hardware data base management system. The B160 costs \$1,850.

Exhibitors Unveil Variety Of Modems, Network Aids

By Ronald A. Frank
CW Staff

LAS VEGAS — Manufacturers brought out a variety of modems and network aids at the Interface conference here last week.

Penril Corp., Rockville, Md., introduced the 2400 DCM diagnostic-controlled modem. The 2400 bit/sec unit includes centrally controlled interactive diagnostics for operation in 2,400 bit/sec point-to-point and multipoint networks.

Designed for the user who has 10 to 20 modems, the 2400 DCM is said to avoid the investment of technical control centers by testing and controlling transmission functions. Testing and control of remote site functions are performed over a secondary channel from the central site so no additional test equipment is required, the company said.

The 2400 DCM includes features that allow the user to check the status of the network without operator assistance at remote locations. Tests included with the unit are analog loopback, line loopback, digital loopback, modem self-test, on-line monitoring, remote-controlled end-to-end testing, and antistreaming shutdown, both automatic and manual.

The 2400 DCM costs \$1,650 for a central site configuration and \$1,350 for a remote site installation.

DMW Group, Inc. of Ann Arbor, Mich., announced the availability of its network design tools on the Tymnet data network. The software programs allow users to configure and fine tune their private line nets by determining the least cost network options.

Major tariff changes are covered by program updates so that users can track network options as needed. The programs include an on-line tariff guide for computing comparative prices for domestic carrier service. Response 1 and 2 are interactive programs for analyzing multipoint lines. The Network Design & Management System (NDMS) calculates optimum network layouts and produces rate tables and other parameters that enable the user to evaluate the operation of network lines.

Basic charges for the full NDMS for a six-month period is \$650 plus 40 cents per Tymnet resource unit.

Comdata Corp. of Skokie, Ill., showed its dual modem unit designed to replace Bell 202 and 1130 data sets. Called the 330-2R0, the unit provides smaller installations with features previously available only to larger sites, the firm said. The autonomous modems for dial-up applications cost \$170 per modem plus a basic \$150 for the circuit board enclosure.

Western Union Information Systems of Mahwah, N.J., exhibited its System 4100/2 statistical multiplexer, which can operate with both synchronous and asynchronous applications. Using dual microprocessors, the multiplexer statistically multiplexes data from two 1,200 bit/sec asynchronous lines and one 4,800 bit/sec synchronous line over a 4,800 bit/sec facility. An advanced data link protocol with automatic repeat request is used for data reliability, the company said.

A typical system made up of four synchronous and 16 asynchronous lines, operator panel with keypad and display costs about \$10,000.

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Cutting Back in Light, Heat

Coal Shortage Not Crippling DP Sites — Yet

By Ann Dooley

CW Staff

Computer centers in coal-dependent areas continued to hold their own against dwindling coal supplies as the United Mine Workers' strike carried

on into its fourth month last week.

Although usage curtailments and power reductions occurred in those areas most affected by the strike, most installations cut back by turning off lights and lowering heat — not by re-

ducing computer use.

The consensus among several computer users in West Virginia, Ohio and Maryland was that power to DP centers would be reduced only after much larger cutbacks in hours, general workload or labor had occurred in other parts of their companies.

"Heavy industry gets hit first and we use just a fraction of that power," according to the DP manager of a West Virginia manufacturing company.

But most DP personnel remained unsure of what would happen in their near future. No one could predict how long the nonunion coal supplies being bought by the utilities would last or what the outcome would be as Presi-

dent Carter invoked the Taft-Hartley Act.

"We've done everything we can and now we're just sitting back waiting," according to Bob Hubbard, DP spokesman for the Union Carbide Corp. of Charleston, W. Va.

Edward Sloane, vice-president of Wheeling Dollar Savings and Trust Co. of Wheeling, W. Va., said the local utility company was thinking of cutting voltage by 5% and "that's putting us on the very margin of what we can work with."

If usage curtailment goes much past the 30% level, the bank may have to reduce computer processing time by eight hours each day, Sloane said.

IBM Eyeing Retail Stores

(Continued from Page 1)

sites have also received extensive publicity in the general media, especially on radio.

Industry Sources Skeptical

Partly because of these differences between the old and new demonstration centers, some industry sources have expressed skepticism about IBM's professed disinterest in retailing the 5110 at present. They called the latest centers evidence that the firm is at least toying with the idea of retailing the 5110 and perhaps its other small business systems.

Although he declined to speculate about IBM's long-range marketing intentions, William Grinker, executive vice-president of American Used Computer Corp. here, noted that two industry phenomena have forced IBM and other established hardware vendors to consider alternate avenues for distributing their small business systems.

The first of these phenomena is growing user sophistication. Until a few years ago, executives of small and medium-sized business lacked a strong technical grasp of computers and thus were often intimidated by them.

As a result, potential small systems users seldom initiated inquiries about computer hardware, and vendors had to aggressively recruit almost all their customers, Grinker said.

During the last few years, however, the computer-shy users have begun to give way to a new breed of small systems customers who are confident of their computer literacy and increasingly insistent in their demands for both hardware performance and economy, Grinker said. The presence of this growing generation of aggressive users is making retail stores an economically viable means for small systems suppliers to distribute their products, he added.

The other phenomenon that has prompted small systems vendors to re-examine their distribution methods deals with economics. "For a long time, IBM had control of computer technology, but a few years ago that control fell into the hands of other people like overseas vendors and semiconductor manufacturers," Grinker said.

Since then, hardware prices have dropped steadily, and competition among suppliers to cut prices still further has intensified.

To maintain high profit margins under these circumstances, vendors have been forced to redouble their efforts to hold down operating overhead, Grinker said.

If IBM does someday formally enter the retail field, the move will probably have a profound impact on companies that retail primarily to the most sophisticated small systems users, Grinker said.

"When a business depends on a com-

puter, it needs to be able to get service for that system within two or three hours," he explained. "It's highly unlikely that companies that already retail \$10,000 to \$15,000 systems to small and medium-sized businesses would be able to match IBM for service and reliability."

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GAO Demonstrates Security Gaps at SSA Site

(Continued from Page 1)
(D-Conn.) stated, "Too many of our citizens rely on Social Security — and too much money is involved — for careless security procedures."

"I am frankly shocked at such lax security at such a major federal installation. HEW [the Department of Health, Education and Welfare] spends more than any other federal agency," Ribicoff warned Joseph A. Califano, Secretary of HEW, which includes the SSA. "There must be a greater concern in seeing to it that the department's computer security programs are strengthened," the senator said.

SSA last week had "no comment" on the compromise of its computer operation by the GAO auditors.

"Unauthorized personnel have access to the computer room and tape vault. Magnetic tapes, disk packs and other property can be removed without proper authorization, and blank and valid Social Security and Medicare cards can be taken from the central computer facility without question," Curtis said in his letter to Wortman.

Considering the overall impact So-

cial Security has on millions of Americans and the results which would occur if its central computer facility's operations were interrupted, we believe that more effective controls and security procedures must be established to protect both Social Security records and property and the privacy of the American people," Curtis added.

Part of SSI Review

GAO auditors investigated SSA's internal computer controls between Jan. 23 and Feb. 3 as part of their review of the Supplemental Security Income (SSI) system, which issues benefit checks to blind and disabled citizens.

They found, for example, that the central computer facility's turnstiles permit entry and exit at the same time once they have been activated by a security badge. As a result, several people can go in or come out of the center on a single admission authorization.

Two GAO auditors got into the center with one security badge and without being noticed by the security guards, who weren't in direct view of the turnstiles.

Temporary badges, which can be obtained by an authorized individual and then distributed to people not normally permitted access to the computer center, provide another means of entering the operation. While personal identifiers — such as Social Security number, name and organization — are required when a temporary badge is issued, the automated security system isn't programmed to make sure only one valid badge exists for every authorized person at any point in time.

During its investigation, the GAO team successfully admitted a GAO auditor who was not authorized to be on the SSA computer site.

Security guards seldom match permanent authorization badge pictures with the person trying to enter the center. If an authorized person permits it, unauthorized people can easily get into the computer center, the GAO auditors concluded.

Unauthorized Exits

Inside the center, unauthorized exits can be made without alarming the security guards by simply removing the screws of the electromagnetic connectors on each of the doors. Opening the door will then fail to break the circuit in the connector, so no alarm will sound to alert the guards.

Again, a GAO auditor demonstrated this flaw in the security system by taking Social Security property through one of the opened emergency doors without the security guards' knowledge.

Effective controls also need to be established regarding the removal of magnetic tapes and disk packs from the central SSA computer facility, Curtis said.

The GAO auditors were able to remove an entire cart of 38 tapes — two segments of the SSI master file — from the facility. In addition, they were able to smuggle tapes out in their brief cases and lunch containers and to remove tape dispatch passes for use in obtaining still more tapes.

The GAO recommended that SSA stop using tape dispatch passes and use a transmittal sheet instead, which would show authorization for removal of tapes and disks. Furthermore, both the SSA's tape library control section and security guards should be required to reconcile the number of tapes being removed by serial number, the audit agency said.

Security guards should always search notebooks, lunch containers and brief cases of people entering and leaving the computer facility, the GAO added.

"Social Security has not developed a comprehensive approach to securing the central computer facility, and no formal in-depth study detailing security requirements and ways to meet them has ever been made."

Curtis pointed out that a July 1976 Mitre Corp. report on SSA security warned that most of the agency's physical security measures had been implemented on a piecemeal basis. "We agree with this finding and believe that the new automated security system is the latest example of this piecemeal approach."

"No in-depth risk-analysis has been performed to determine what security procedures should be established, and furthermore, no overall structured approach has been developed for securing the central computer facility," Curtis added.

Witness's Testimony Barred

(Continued from Page 1)

Furthermore, the Memorex attorneys argued they had to start somewhere in the company since "you are not very likely to find the president putting memos in the file" on such matters.

In addition, the Memorex attorneys noted that Cunningham addressed the subject with the man in charge of IBM's disk drive program, who did have profit-and-loss authority for that program.

Purpose of IFA

Cunningham was, however, allowed to answer questions relating to the development of Integrated File Adapters (IFAs) and other practices at IBM. He indicated, for example, that IBM's strategy for attaching disk drives with IFAs was for the purpose of making it "extremely difficult for a competitor to IBM to attach a computer product to the central computer unit" and that "the structure and method of the attachment strategy was to make it both physically and economically impossible to compete in the disk file area with IBM."

However, Cunningham said, the corporate legal department would not approve the strategy, apparently since it was couched in anticompetitive terms, and the following exchange took place on the stand.

"Q. Mr. Cunningham, after you learned that corporate headquarters had not approved the new attachment

strategy, what was done in San Jose?

"A. We had a series of meetings to prepare justifications for the strategy."

"Q. Was there any change in the strategy itself?"

"A. No."

Cunningham said the strategy was developed "in terms of its anticipated effect on competition ... and how it would affect competitors."

When corporate legal counsel rejected that approach, Cunningham said, "we were asked to prepare justifications for corporate headquarters insofar as potential customer benefits that could be derived after we put together the strategy itself."

In another area, Cunningham also testified that IBM designed the Fixed-Term Plan (FTP) — its first long-term lease arrangement — in order to lock customers into its products and to exclude competition.

The FTP was designed, he said, only for products in areas where IBM had competition.

Later, Cunningham said, when he informed management of it, he did not feel FTP was working. Managers showed him a study of Memorex which indicated the FTP was having its effect and would cause Memorex to have a deficit and reduce its capability to get new financing.

The management at IBM's disk facility said the pricing actions on the part of IBM would drive Memorex to bankruptcy, he added.

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The money is gone — withdrawn — and so is the coin dealer, officials said.

Charles Walsh vanished allegedly after receiving his monthly bank statement that showed a balance of \$100,085 instead of the \$85 that he had actually accumulated, a spokesman explained.

The error apparently occurred when an operator hit the wrong key

on a keypunch machine, diverting two \$50,000 deposits from a commercial account into Walsh's savings account. The \$100,000 should have been deposited into an account with a bank number one digit different from Walsh's.

A warrant has been issued for Walsh, charging him with failing to appear in court when summoned on charges of defrauding the bank.

The error was discovered by bank personnel during a routine check of transaction records, the spokesman said. Police and bank officials refused to elaborate any further pending an investigation.

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Two Software Packages Back Electronic Messaging

(Continued from Page 1)

Both vendors claimed the same basic advantages over conventional phone messages and letter mail. Phone calls may allow immediate interchange of ideas, they admitted, but only if the intended recipient is available at the phone location called.

Speed is the big advantage over the mails, according to a CCA spokesman who "clocked" the time it took a memo, which required one revision, to take shape and travel from his office to the person he wanted to reach in CCA's Washington, D.C., office. That process took seven days, most of which was spent within his own organization, he noted.

In contrast, 10 minutes using Comet achieved the same results, he claimed.

User Structure

OSI's Messenger provides more structure for the user than does Comet. The OSI package supports a preformatted screen for an IBM 3270 CRT terminal, allowing the user to fill in the subject, the destination or destinations and the text of the message, as well as its priority and an indication of whether delivery is to be immediate or "as wanted" by the recipient(s).

Comet, by contrast, allows the user to format messages as he wishes. It also supports "local" editing of a message text before the text is sent to its destination.

Messenger allows modification of a text, but this apparently can be done only by retrieving it from the recipient's files or queues, reworking them and retransmitting them to whatever recipients are then appropriate.

Comparable Services

The packages appear comparable in the services they provide to recipients, including primarily the ability to scan the messages in the electronic mail boxes and choose the ones to be displayed in full at any given time.

The display/printout summarizing messages on hand and in either system shows each recipient the sender, subject — if the sender provided one, the time and the date each message was sent. Either in the scan display or in the messages themselves, recipients can determine if there were multiple addresses for a given message and, under Messenger at least, how each already responded to it.

Link to Applications

One capability available under Messenger and apparently not under Comet is an interface with application programs so output from a program can be handled as if it were being input by a terminal operator. Messenger users can link into the system through a simple CALL operation, OSI said.

Messenger also provides a centralized control mechanism through which the status of terminals in the system can be changed, from receive-only, for example, to receive-and-transmit.

Messenger functions under "almost any version" of CICS, although OSI hasn't yet implemented it in a CICS-Entry environment. It will work under DOS, OS, DOS/VS and OS/VS and under CICS/360 or CICS/VS, the spokesman added.

The resident program requires about 9K bytes plus room for tables handling such chores as equating symbolic addresses names to real physical locations.

Cost of Packages

Messenger costs \$18,000 or \$600/mo under a 60-month lease/purchase plan that allows 50% of the least cost to be applied to equity.

Comet runs on DEC's RSV 11 on machines as small as the PDP-11/34 with 96K of memory. It can be licensed for in-house use or used on a service basis.

The in-house packaging costs \$40,000 or \$1,446/mo for 36 months, (with a charge of \$350/mo for optional maintenance). On a service basis, users tied into CCA's PDP-11 will be charged \$100/mo per billable account and \$50/mo for each user within that account. That covers seven hours of connect time and 500 messages stored each month, the spokesman said.

OSI is at Rt. 208 North, Hawthorne, N.J. 07050, while CCA's headquarters is at 575 Technology Sq., Cambridge, Mass. 02139.

Calcomp vs. IBM Plea Could Be Heard Soon

LOS ANGELES — The Ninth Circuit Court of Appeals, responding to briefs from California Computer Products, Inc. and IBM, has indicated Calcomp's appeal in that case may be heard here this spring, sources said.

After Judge Ray McNichols granted IBM's motion for a directed verdict, dismissing the case for lack of evidence, Calcomp filed a request for an expedited appeal; IBM then countered. The court has received a total of five briefs.

But getting a hearing and a ruling may be two different achievements, the sources noted. That same appeals court pondered the Greyhound case for about four years before ordering it back to a lower court for a full trial.

Senators, Sipi Also Urge OTA to Study NCIC

By Edith Holmes
CW Staff

WASHINGTON, D.C. — Three senators recently joined Representatives Peter W. Rodino Jr. (D-N.J.) and Don Edwards (D-Calif.) in their request that the Office of Technology Assessment (OTA) study the Federal Bureau of Investigation's (FBI) criminal justice information systems.

Senators James Abourezk (D-S.D.), Birch Bayh (D-Ind.) and James O. Eastland (D-Miss.) asked OTA for "a full-scale assessment and evaluation" of the National Crime Information Center (NCIC) and FBI plans to operate a central message-switching center between state and local police agencies through the system.

As the chairman of the Senate Subcommittee on Administrative Practice and Procedure, the Subcommittee on the Constitution and the Judiciary Committee, Abourezk, Bayh and Eastland expressed concern about the constitutional and privacy issues involved in the storage and retrieval of Computerized Criminal History (CCH) files.

Meanwhile, the Scientists' Institute for Public Information (Sipi), an organization whose Criminal Justice Task Force presented testimony on NCIC in hearings before Edwards' House Subcommittee on Civil and Constitutional Rights last fall, has written to the congressman urging that "an in-depth study of NCIC" be performed by OTA. The General Accounting Office (GAO), a qualified independent organization or all three.

Sipi conducted a preliminary inspection of NCIC last August at Edwards' request and concluded that NCIC has not proved its worth as a crime-fighting tool despite 10 years of operation (CW, Sept. 12).

"The actual benefits of NCIC still remain in the area of surmise, rather than demonstrated results," according to the task force, which consists of computer scientists Daniel D. McCracken, Joseph Weizenbaum and Dr. Myron Uretsky.

During hearings held by Edwards' subcommittee, the FBI and the Justice Department said they would welcome an on-site independent audit of NCIC to satisfy such critics as Sipi, but stressed their belief that reevaluating the need for the criminal justice information system would be like questioning the need for police cars and two-way radios (CW, Oct. 17).

'Benefits Not Self-Evident'

In response to the FBI's testimony and comments regarding Sipi's preliminary report, the computer scientists said in a Jan. 6 letter to Edwards they do not believe "the recited benefits of NCIC" are "self-evident" at all.

"In considering a system which will eventually cost hundreds of millions of dollars, even apart from the political and social difficulties involved, we do not find it acceptable that the FBI call the need for an in-depth evaluation 'questionable,'" they stated.

The Sipi task force pointed out that the FBI itself admitted it does not know how many positive responses it receives from NCIC in answer to state and local inquiries regarding stolen cars, missing persons and the like. Further, the bureau isn't sure what percentage of its NCIC data is "stale and incorrect" or what the dimensions of

its data base would be if it were to provide on-line, state-to-state access through centralized message-switching, as it hopes to do, the scientists said.

Not only is a study called for in light of these facts, they contended, but the work needs to be done "by sophisticated computer professionals."

While they applauded the FBI's willingness to have the GAO establish an on-site auditor for NCIC, the Sipi scientists reiterated the need for audits of field offices at the state and local levels to be done regularly and unexpectedly.

'Serious, Thorny Issue'

"... Some mechanism for independent auditing at the state and local level must be devised. This is a much

more serious and thorny issue than stationing a GAO employee at the [Edgar] Hoover [FBI] building's NCIC control room," the computer scientists stated.

"On a deeper level, very large computer systems that are added to on an ad hoc basis, an expansion here and a modification there, without long-range planning, are systems that are heading for inaudibility and incomprehensibility," they warned.

Quoting from a March 31, 1977 GAO report entitled "Vulnerabilities of Telecommunications Systems to Unauthorized Use," the scientists wrote, "Even without penetration of the NCIC data bases, a perpetrator with adequate knowledge and equipment could intercept communications car-

ried over the NCIC circuits."

Bureau officials told the GAO that encoding techniques and devices are not used to protect NCIC traffic and that their value would be minimal because the greatest vulnerability to the system is the individual terminal operator, the Sipi task force said.

"If the system can be entered for the purpose of intercepting communications, doesn't the question also arise of a perpetrator entering incorrect data in the system, changing or erasing records or deliberately sabotaging the network," they asked. "To mention not-so-far-fetched possibilities, could organized crime, terrorists or foreign powers attempt to disrupt criminal justice information and communica-

(Continued on Page 15)



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Real-Time System Rounds Up Rodeo Scores

By Jeffrey Beeler

CW Staff

BOZEMAN, Mont. — A computerized scoring system is helping to minimize delays and eliminate errors in reporting the results of high school and college rodeo competitions throughout the western U.S.

As soon as a contestant completes a round of competition, rodeo officials enter the individual's score into the system through a variety of teletype-writers and other remote data entry devices. The information is sent by a 300 bit/sec modem to Montana State University (MSU) here, where a Hewlett-Packard Co. 2116B records the score and compares it with previous results from the same event, according to Nicholas K. Shrauger, an MSU assist-

tant professor of electrical engineering and one of the system's originators.

The system then tentatively ranks each competitor according to his score and outputs the resulting standings on an HP 7900 printer back at the rodeo site. With each succeeding contestant, rodeo officials repeat the score-entering process, and the system places the individual's name in the appropriate spot in the revised competitive rankings.

At the end of the event, the system automatically generates a list of final standings. This process continues throughout the rodeo until the system has produced final standings for every competitive event in the program.

While the system is calculating each contestant's rankings, it is also totaling

all the individual scores for each team to produce final team standings in each event.

Season Standings

At the end of the rodeo, the system adds all the individual and team scores from each event to the results of competitions held earlier in the season. From the resulting cumulative totals, the system can determine the season's standings for both individual competitors and teams in each rodeo event.

Thus, during subsequent rodeos, the system can update the season's standings in real time simply by adding new scores to the previous totals.

Shrauger described the configuration as the first real-time rodeo scoring system in the country. Since its develop-

ment in 1971, it has served more than 20 amateur rodeo events, including 11 national championships, for both the National Intercollegiate and High School Rodeo Associations.

Perhaps the high point thus far in the system's service occurred last August at the High School Championship Finals in Helena, Mont., where the configuration kept score for 1,131 contestants and 1,125 entries, Shrauger said.

Before they adopted the current system, rodeo officials kept track of scores and standings by hiring secretaries to manually record all competitive results as they occurred. In most instances, a different secretary was assigned to oversee each event, and officials later analyzed the results to determine individual and team winners, the engineering instructor explained.

Under that system, however, rodeo officials often could not identify the top finishers in each event until two or three hours after a competition had ended; even after a lengthy delay, scoring errors frequently occurred.

"At one rodeo several years ago in Helena, I watched the officials award a trophy to one individual and then take it away from him and give it to another competitor because they had suddenly discovered an error in the scoring," Shrauger recalled.

Shrauger attributed the frequent delays and miscues to the complexity of rodeo scoring. In high school, for example, a typical rodeo consists of 12 events, each of which in turn consists of several competitive rounds.

Under the earlier scoring system, rodeo officials not only had to keep track of all the results from each of the 12 events, but also had to manually analyze the accumulated data to determine standings and winners. To make matters worse, they also had to manually figure the final scores from each rodeo into the season's standings.

Undergrad Project

No long after the embarrassing Helena episode, Shrauger concluded that rodeo officials could simplify their monumental scoring problems by replacing their manual bookkeeping methods with a computer system. He broadened the idea to a local rodeo organization and, after the membership gave its approval, he assigned the task of developing the system to his undergraduate students.

As part of their project, the students wrote, debugged, maintained and documented all the programs for the configuration, Shrauger said.

Because of the system they eventually developed, rodeo officials have been able to report scores and standings usually within three or four minutes of the time a contestant completes each competitive round. With the previous scoring method, the delay was often hours, Shrauger noted.

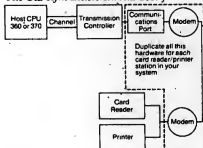
This decreased lead time enables television and radio sportscasters to inform their audiences of new scores and changing leads almost as soon as they happen, he added.

Since it began operating about seven years ago, the system has undergone several enhancements that allow it to perform functions other than just scoring. In 1972, students programmed the system to randomly draw starting positions and riding stock for each rodeo competitor.

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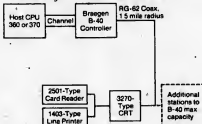
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One Micro Handles 2,500 Houses

Cable TV Firm to Offer Home Alarm System

By Tim Scannell

CW Staff

DAYTON, Ohio — Cable TV subscribers here may soon be able to subscribe to a home security system that automatically summons police, fire or rescue departments in case of an emergency.

Designed by Cableguard of Dayton, Inc. and currently installed on a test basis, the system is actually a network of electronic smoke, fire and intrusion alarms installed within subscribers' homes and connected to a central computer center, via TV cable, according to Walter Hotz, Cableguard president.

When a detector is triggered, an alarm is sounded and an electronic message is sent over the television cable to the microcomputer, which is monitored 24 hours a day. Each message is programmed to alert a specific doctor or emergency department and can even be adjusted to signal a neighbor, Hotz said.

Each home that subscribes to the protection service is equipped with a digitally addressable "subscriber terminal" that acts as a mediator between the signals sent along the cable and the detectors installed at various locations throughout the house, Hotz explained. The signals, sent by and to the terminal, are controlled from a central data center situated at the other end of the cable.

"The computer is [programmed] with all the demographics regarding the area in question and the home involved," Hotz said.

Constant Polling

One great advantage of the system is that it is constantly in an active state, according to Hotz. An "interrogator" sends a signal from the central system to each terminal once every six seconds, checking for any interruptions or "off" conditions.

By using radio frequency technology, "we're not waiting for someone to tell us that something is wrong," he said. "We're constantly polling each terminal," he

noted.

Signal integrity is maintained by a "reinterrogation" system that limits the possibility of any false alarms being transmitted, Hotz said. When a signal is received at the central computer, "our operator can reinterrogate the terminal up to five times in less than 10 seconds," he claimed.

A basic protection system, Hotz pointed out, would consist of intrusion detectors installed at perimeter doors and smoke and thermal detectors placed at "prime fire areas such as the kitchens, the furnace area, garage, attic and so on."

Also included with the package is the installation of both a "panic button"

and a "medical alert button." The panic button would be placed at a normal point of access in the house, such as the front door. When a person answers the door, "all he has to do is hold his hand on the button," ready to depress it in the event of an intrusion attempt.

When the button is pushed, a local alarm is sounded and a signal is sent to the central computer, summoning help.

The medical alert button is "placed in the home at the discretion of the homeowner," Hotz said, noting typical locations might include an elderly parent's room or the master bedroom. "In the event that someone has a seizure or is

under medical duress, all they have to do to activate the alarm is press the button," he stated.

The central computer is actually a Z80 based microcomputer manufactured by Tocom, Inc. Because of its limited memory capacity, it can only handle up to 2,500 homes, Hotz stated.

"At this stage in the game, we went with this size computer for the simple reason that ultimately it will become part of a network of connected systems, he explained.

The price of installing a basic system is approximately \$625 with an extra \$15.95/mo to cover maintenance and monitoring fees, Hotz added.

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Do-It-Yourself Aspect of DDP Seen Changing

By Ivan C. Francis
Special to CW

Although finding economic justification for distribution of processing may be easy, the implementation of a distributed DP (DDP) system is something else again. One of the major reasons that it is difficult has been the lack of vendor support and vendor-supplied facilities.

There are relatively few tools available today to assist a user in distributing his work. Current distributed processing users have to expect to do a great deal of work themselves.

However, this is changing. To meet the needs of the user community, vendors are providing an increased level of properly supported software and facilities oriented to DDP concepts.

In spite of the do-it-yourself implementation problems, a number of major corporations are investigating or implementing distribution of processing functions. In general, these companies feel distributed or decentralized processing gives them better control over their business and more timely solutions to business

problems. However, it should be noted that in most cases, only specific applications are distributed and that the central site operation is still retained by these users for the bulk of their applications.

Distributed Control

It is debatable whether or not companies are willing to distribute control along with processing. The move away from the typical hierarchical organization is a difficult one. Companies usually want to fit their multiple computers to the current departmental structure rather than change the organization to achieve a potential savings in processing cost.

In other words, the consideration of human factors such as the disruption of familiar procedures and problems associated with the transfer of responsibilities to new or different departments rightfully has a great deal of impact on the way processing is distributed.

The efforts of a number of companies are spotlighting the advantages and disadvantages of DDP. DDP is not panacea, but when applied to the right applications, it can save in communications cost, enhance system modularity, provide backup processing capability, improve response to business requirements and offer protection against host failure. On the other hand, however, centrally oriented processing provides unified control, easy update and retrieval, simple error recovery, operations economy and easier training on familiar systems.

The do-it-yourself aspect has caused many organizations to put off distribution for a while because of very high initial implementation costs. The decision to move to DDP today probably hinges as much on an organization's confidence in its technical competency as any other factor.

Management Considerations

Perhaps the most important consideration when assessing a move to DDP is whether the applications can really benefit from distribution. It is a simple fact that many applications are not distributable.

Assuming that a distributed processing application exists, the next question is the best schedule for implementation. The timetable for implementation often rests on the willingness of the user to undertake the effort involved.

Since distributed processing is still in its formative stages, implementation requires considerable investment in user's time as well as money.

Many of the pioneers in DDP have experimented with it by isolating one application involving one remote point

and doing a trial distribution.

All organizations have a considerable investment in their current equipment, personnel and programs. They must evolve from their current situation rather than revolutionize their operation just because technology gives them the opportunity.

Changing Requirements

The do-it-yourself requirement will change significantly in the next few years as software is provided to assist users in taking maximum advantage of new low-cost hardware technology and its distribution throughout their organizations.

Programs that facilitate DDP will emerge in four areas: workload distribution, program development, data management and human interfaces.

In distributed applications, the routing of transactions, jobs or data from system to system will be transparent to the end user, who will not necessarily know whether the processing was done locally or at some other node in the network.

Program development tools will be provided to promote the centralized creation of programs for remote location computers. This will encourage development and testing of jobs at a central location in the network, which fosters standards and prevents duplication of effort.

The most difficult area of distributed processing development will be the control of the data base. A major premise of DDP is that the data belongs in the hands of its most frequent users. If part of a

data base has high usage by several computers, it may be duplicated at various locations, in which case data integrity and control are more complex than with today's central data bases.

The lack of experience in effectively controlling distributed data is the biggest single drawback in the implementation of totally distributed systems. Algorithms are being developed to make distributed data handling more effective without putting an undue burden on the user.

More progress has been made in the ease-of-use area than in any other. There are already available, via CRTs, systems providing tutorial operator aids, question-and-answer operations and fill-in-the-blanks applications customizing such as Query Language Processors.

The major goal of the ease-of-use tools will be to make all of the machines in the system look the same to anyone wanting to use the system, no matter where the individual is at the time, and to reduce the need for specialists at remote locations.

One of the keys in applying all these facilities is a properly organized communications network linking the distributed systems. In theory, communications is not a prerequisite for distributed processing; however, from a practical point of view, the resources will seldom be close enough for direct connection and therefore a communications network will be required.

Francis is director of distributed communications program management at Unisac.

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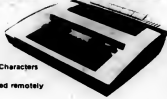


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Preparing for 1979 Launch

System to Help Nasa Handle Space Shuttle Data

NASSAU BAY, Texas — When Orbiter 102 becomes the first space shuttle to be launched into orbit from the Johnson Space Center here in early 1979, it will have generated an astronomical amount of data during its 10-year, \$6.2-billion planning stages.

In planning the best way to handle that data plus the continuing stream of generated data, National Aeronautics and Space Administration (Nasa) officials asked their systems analysts to design a DP system that could:

- Track the location and inventory of the thousands of parts and supplies needed for the shuttle.
- Confirm the installation and maintenance of all required parts.
- Determine the status of a part in repair.
- Change related documentation in the event design changes are made.
- Keep contractors up to date.
- Determine how a load change in the space shuttle will affect the center of gravity.

To do these things, Nasa needed flexible systems that could handle a wide variety of applications as well as the constantly changing, high volume of data. The system would also have to communicate with users and contrac-

tors across the U.S., many of whom are not computer-oriented.

A Control Data Corp. Cyber 74 and MRI Systems Corp.'s System 2000 data base management system (DBMS) were chosen to implement the Shuttle Project Information Management System (Spims). Spims was started in July 1975 at the space center.

While Spims encompasses many important project areas, appearing at the top of the list are applications for tracking inventory, monitoring problems and controlling documentation.

Complex Inventory

Nasa's inventory problem is particularly complex in that it involves several thousand parts scattered across several locations. Additionally, it is critical that all components be in perfect order, for once an orbiter is launched, it would be difficult to replace mal-

functioning equipment.

To resolve this problem, Nasa designed an inventory system referred to as Flight Manifest Hardware and Tracking System (FMHTS) to track the history of all space shuttle parts as well as crew supplies and special equipment aboard each flight.

According to Lou DeWolf, the systems analyst in charge of FMHTS, Nasa is aiming at a two-week turnaround between orbiter flights. "This means we have to keep track of all these supplies between flights and have supplies ready for the next flight."

"Eventually there will be both an East Coast and a West Coast launch site," he continued. "A pool of equipment will be kept at Johnson Space Center and shipped to either coast just prior to launch. The DBMS will print inventory lists and a pre-packing list by location so that crews will know where to get the equip-

ment called for in a certain flight. The system will also track payloads on board the craft."

Problem Reporting

Another Spims application is the Problem Reporting Data System (PDS), which allows Nasa to monitor progress on problem resolution from initial discovery of the problem to the final correction.

"When someone asks whether a certain piece of hardware will be repaired in time for the next orbiter flight," PDS analyst Sterling Fugman said, "the answer can be found in the data base."

"PDS differs from the other applications in that everything is done in a forms mode," he continued. "A form predefined by the DBMS comes up on the CRT and we simply fill in the blanks with the proper data elements."

"We keep track of any anomaly on the orbiter, whether it

occurs before, during or after the flight," he added.

Shuttle Requirements Traceability (SRT) is still another application under Spims and was designed to ensure consistency within the documentation for the shuttle project.

"There are 18 volumes of documents containing standards for the space shuttle program," Brady explained. "A change in one affects many others ... and they are always changing. Our DBMS has allowed us to make these changes much more quickly than we could have without one."

Considering the entire network, a large number of terminals have access to Spims data. At Johnson Space Center alone, there are approximately 40 terminals used by the engineers, scientists and analysts on the space shuttle project, with 12 to 15 of them accessing the data bank at one time.

Senators, Sipi Urge OTA To Study NCIC's Impact

(Continued from Page 9)
tion if NCIC becomes the chief network performing those functions?"
The Sipi task force further objected that Justice is "foreclosing" future NCIC growth

options by directing that a blueprint be formed for message-switching, including CCH, message-switching. Calling this a cart-before-the-horse approach, the scientists suggested that "the blueprint itself should determine whether message-switching over NCIC lines is desirable or even feasible."

They also said NCIC options are being limited with every addition the FBI makes to the system in the absence of a long-range plan. The FBI's new Criminalistics Laboratory Information System (Cris) and the Operation Identification program, intended to encourage citizens to mark valuable items with a unique personal identifier, were cited by Sipi as examples of recent NCIC capabilities.

"Our point is that the NCIC is being added to piece-by-piece without addressing already identified problems and in a way which makes future changes less easy, likely and possible," the scientists said.

Senators Abourezek, Bayh and Eastland also urged in their request to OTA that alternatives to NCIC be studied. They asked that each alternative include an analysis of the effects of the system on citizens' political rights and privileges.

The Sipi members suggested that the NCIC policy advisory board be expanded to include outside scientific representatives in addition to people from the criminal justice community.

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News Magazine's System Expedites Production

By Tim Scannell
CW Staff

WASHINGTON, D.C. — U.S. News and World Report has eliminated most of the manual paste-up and proofreading chores involved in publishing a weekly news magazine, thanks to its recently installed computer-based publishing system.

Described as "an evolution rather than a total change," the system can produce complete editorial pages electronically, according to John Tuohy, director of production and purchasing at the magazine's headquarters here.

The U.S. News system is based on an Information International, Inc. (III) 3600 illustration scanner, an III Videocomp 370 typesetter and an Atex, Inc. copy processor. The system elimi-

nates most of the problems encountered during the old, hot-metal days, an III spokesman said. It has done away with the need for outside camera work and art heads, special types, couriers using commercial and charter flights to move materials and the need for a publisher's representative at each of several printing plants, he explained.

Reporters and editors enter copy into the system by using one of the more than 50 display terminals. Copy is "recycled" by the editors two or three times and sometimes rewritten as many as six times to fit space requirements without ever having to generate a "hard" copy, the spokesman said. Concurrently, art work, line work and photographs are scanned by the 3600,

which electrically converts photos to digital halftones, he said. Both copy and photo information are transferred and stored on the Atex system.

Copy and graphics then go to the Videocomp 370 CRT typesetter, which produces complete pages of text and halftones, the spokesman explained. As the page proofs are reviewed and approved by the editorial staff, the Atex system merges the data for transmission to printing plants in Chicago, Los Angeles and Connecticut. At each plant, another Videocomp, equipped with a halftone record feature, receives the information transmitted from Washington and produces page-size film with all type and graphic elements in proper position, ready for plating and printing, he said.

Information is transmitted to the various printing plants via the Vestar satellite, Tuohy said. This mode of operation is "cheaper than AT&T land line and the quality is generally 'cleaner,'" he added.

Several-Year Evolution

"The system actually evolved over several years," Tuohy explained. The magazine was already using the Atex front-end processor when it decided to purchase an III Videocomp system, he stated. It was "the best available typesetter at the time and the most expensive, but it was the type of quality we wanted," Tuohy recalled. "After installation, we got involved with electronic generation of halftones. We've always wanted to send an entire page; it's something we had been trying to do for quite some time," he said.

Since the system became operational, deadlines for photographs have been extended by two days, Tuohy said, and editors also know exactly what each page looks like and can close pages as fast as they can write, edit and format the copy and photos.

Although "thoroughly satisfied" with the system now, Tuohy indicated all was not a bed of roses when the machines were first installed.

The 3600 scanner was actually a prototype, he said, and "you always have some difficulties with prototypes."

However, "we've found all the bugs and corrected them and the system will probably be 99% stable from here on. Of course, I say that with my fingers crossed," he added.

Tuohy observed that the present system also has room for improvements and upgrades. "We are now able to generate a high-quality halftone for magazines that is equal to anything you can get from a camera, but we think we can improve the quality," he said.

The III spokesman said that when President Carter was overseas, U.S. News took a photograph, sent it to Washington via satellite, reproduced it and, using the 3600, put it into digital form. That same day, it appeared in the magazine.

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and I've filled in new information
on the other side.

Put old label or label information here

Reason for Errors Unclear

Support Recipients Get Paid Twice, Then Billed

By Brad Schultz
CW Staff

LIBERTY, Mo. — Clay County's computerized child support system started operation recently by generating duplicate support checks for needful mothers — and then mailing court-ordered delinquency notices to the same women instead of the children's fathers.

Although circuit clerk Edward J. Wnuk attributed the mistakes to human error rather than to the system that was installed under his administration by Diversified Computer Services, Inc., the county DP manager is contending Diversified got an unclear picture of system requirements from Wnuk's office.

"It was a programming type of error," Wnuk stated. "It picked up the [man's] name, but the programmer somehow misconfigured a program and it picked up the woman's address."

The problem was early corrected, according to Wnuk. Duplicate child-support checks totaling \$2,550 were stopped and destroyed by his staff before they were mailed. The erroneous delinquency notices, however, were not caught before they were sent.

'Funnier Than Heck'

The errors occurred only in the first batch of notices and checks, Wnuk said. "Personally, I thought it was funnier than heck when I saw it the first time," he said, "but the recipients didn't think it was very funny because they didn't understand what we were doing."

Wnuk reportedly changed the locks on his office door to keep Diversified from coming out and prevent what he indicated he feared would be further bungling. He is said to have asked the county to put its DP manager, Bob Williams, in charge of conversion to the system from that point.

However, Wnuk said he had the locks changed soon after the mishap to comply with federal and Missouri security requirements. There is a constant threat of sabotage since someone could break into his office and alter

certain records in such a way that — for example — a man's delinquency would be wrongfully expunged, he noted.

Needs Not Clear

Williams indicated that neither Wnuk's office nor Diversified had a clear idea of what requirements the child support system had to meet.

"Missouri was the 50th state to come into compliance with Title 40 of the Social Security Act," Williams explained, pointing out that Missouri's child support statutes were thus different from any other state's at the time the system was designed. Further, no other county in the state had experience with the law, and Clay County was challenged to use products never before applied to such tasks in an effort to establish the best system possible.

"So it's basically a 'from scratch' system. It was an unknown from the user standpoint — it wasn't sure what he needed — and it was an unknown from the contractor's standpoint. . . . we couldn't define the system, in effect," Williams said.

Williams indicated the system malfunction and attempts to explain and resolve it should be seen in the context of Wnuk's political situation. According to Williams, Wnuk had been Clay's presiding county judge until he was defeated in a reelection bid. (In Missouri, county judge is an elective administrative post, called "commissioner" in other states.)

Wnuk was appointed to his present position by a former Missouri governor, but must win an upcoming election to retain the post, Williams added. Before Clay County judges received complaints about the malfunction from half the 100 women involved, Diversified had been in control of the conversion to their system, but the women's response persuaded the county judges to grant Williams control, especially of the programming.

Additional information on the conversion is available by writing: Conference Registration, Suite 1010, 5959 W. Century Blvd., P.O. Box 91295, Los Angeles, Calif. 90009.

conversion. Williams has since hired three temporary programmers and plans to deduct their salaries from Diversified's fee.

Neither Wnuk nor Williams blamed the hardware involved: Datapoint Corp.'s 4530 minicomputer configuration, including the 5500 CPU with 20M-byte disk drive.

Four of these 4530s were ordered from Diversified after a county study found its existing NCR Corp. configuration, inadequate for compliance with the Social Security Act and other needs, Williams said.

Aside from the 4530 allocated to Wnuk's circuit clerk administration, 4530s were assigned to the county's voter registration, tax assessment and collection and general accounting facilities, respectively, Williams added.

All configurations have been "operating beautifully" except the one assigned to Wnuk, he said, adding that the county has continued relying in part on its NCR Century 101 CPU with four 29 million-byte Model 657 disk drives while the child support malfunctions are resolved.

About 1,500 child support and alimony cases have been passed back to the NCR equipment, and about 500 child support cases remain with the 4530 system, Williams noted.

While he predicted the problems will be resolved, Williams confirmed NCR officials have verbally agreed to leave their equipment beyond the April 1 deadline for completion of Diversified's system.



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Seminar to Detail RFPs

LOS ANGELES — The American Institute of Aeronautics and Astronautics and the Technical Marketing Society of America will co-sponsor a two-day conference on preparing requests for proposal (RFP) at the Hyatt House Hotel here March 27-28.

Each element of the RFP will be specifically addressed, according to a spokesman. Topics will include effective management of the overall RFP preparation process; planning for ef-

fective source selection; data and configuration management in the RFP; software procurement in the RFP; and separating fact from fiction.

Also to be covered are preparing the technical section of the RFP and preparing the cost section of the RFP.

Additional information on the conference is available by writing: Conference Registration, Suite 1010, 5959 W. Century Blvd., P.O. Box 91295, Los Angeles, Calif. 90009.

Emberson Gets IEEE Post

NEW YORK — Dr. Richard M. Emberson has moved from the position of acting general manager to that of general manager of the Institute of Electrical and Electronics Engineers, Inc. (IEEE) by vote of the institute's Executive Committee.

Emberson is also the IEEE's executive director.

A native of Columbia, Mo., and a

resident of Huntington, N.Y., Emberson is a fellow of the American Physical Society and the American Association for the Advancement of Science.

He is also a member of the American Astronomical Society, the American Association of Physics Teachers, the New York Academy of Science and Sigma Xi, the honorary scientific society.

Navy System to Process Satellite Weather Data

By Tim Scannell
CW Staff

MONTEREY, Calif. — The U.S. Navy is planning to activate a satellite-based system later this year in an effort to improve the accuracy of global weather forecasts.

The system here is designed to process information received from both the Defense Meteorological Satellite and the proposed Seasat satellite as well as from such conven-

tional sources as land stations, radiosondes, aircraft, ships and automatic weather buoys, a spokesman said.

Now running test data, the system will become operational after completion of a high-speed communication interface that will link the antenna in Monterey with data collection stations in Maine and Washington State via satellite, the spokesman explained.

The heart of the system is a Control Data Corp. Cyber 175, which will sort all of the data transmitted from the satellites and merge it with other data collected from various points around the globe. This telemetric data will include a digitized view of the atmosphere in the visual and infrared spectrum, temperature, humidity and two profiles of the stratosphere, the spokesman related.

Information will primarily be provided by the satellites because of their ability to monitor weather conditions over the oceans — an area in which few weather stations have been used successfully because of the expense and equipment losses, the spokesman stated.

Data Volume

The Defense Meteorological Satellite, which makes two

passes each 24 hours over a given location on the globe, sends 10 billion bits of data to the two ground stations on each of its orbits. This data is written to disk files in Monterey at the rate of 21,000 computations per second, filling a disk in less than five minutes, the spokesman said. An extremely high-capacity on-line (Ehco) file is then generated by merging this information with data received from the other earth-bound sensors.

Data needed to recreate a visual image of the earth's atmosphere — the "satellite picture" — is stripped out and transmitted to users. The remaining data, obtained from six different radiation windows in the atmosphere, provides a profile of the temperature and humidity from satellite altitude down to the earth's surface. The Cyber 175 uses this data in conjunction with known hydrodynamic equations and laws to produce a weather forecast, the spokesman said.

Forecasts Shared

A complete weather forecast, with emphasis on the Northern Hemisphere, is produced every 12 hours by the Monterey complex. The data is transmitted over the Naval Environmental Data Network to the Navy's ships and weather centrals and shared with other government agencies and foreign governments through the World Meteorological Organization Network, the spokesman explained.

The installation at Monterey, which has been operating since 1961, now includes three CDC 6500s, two CDC 3200s, two 8090s and the Cyber 175. The system has a total on-line disk storage capacity of 48M 60-bit words.

One particular problem that has been overcome through the use of satellites in weather forecasting involves translating the earth's curving surface into an accurate, flat representation. Using satellite data, the computer pulls the world into a "quadrilateral spherical cube," or six-sided box, which is then inflated so that each point in each of the six planes occupies the same position it would if the plane were to be seen in its natural spherical state, the spokesman said.



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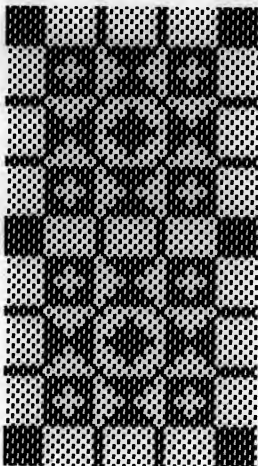
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DP-Aided Design Weaves Together Technology and Art



"Stars and Squares," "Snowball" and "Star of Bethlehem" (clockwise from left) are works of weaver/programmer Karen Huff.

By Marguerite Zientara
CW Staff

CAMBRIDGE, Mass. — When Charles Babbage conceived the idea of a general-purpose, programmable computer about 1833, he attributed his inspiration directly to the Jacquard loom. Now, nearly 150 years later, the computer is being used by some weavers as an aid in designing handwoven patterns.

One such weaver is Karen E. Huff, a software engineer for Intermetrics, Inc., a consulting firm here. With 13 years of computer experience and nine years of weaving as a hobby, Huff said, "It was natural to put the two together. Anybody who's involved with handweaving would think of it if he or she had exposure to computers — it's a very natural transference."

Huff has used a plotter as her basic tool in developing weaving designs. "I originally had the idea that a computer plotter could be used to do the work

that I did very painfully by hand and with lots of errors," she said, referring to the tedious, time-consuming and error-prone task of working out a weaving design on graph paper.

Search for Representation.

The essence of weaving structure can be reduced to a pattern of warp (vertical thread) and weft (horizontal thread) crossings — one must determine where the warp crosses over the weft and where it crosses under.

In order to determine what the structural appearance of the woven fabric will be, the weaver can write down on graph paper the threading, tie-up and treadling instructions in handweavers' notations and from there work out the cloth diagram.

Handweavers' notations occupy one horizontal and one vertical border of a piece of graph paper. In certain squares of this border grid, the weaver can indicate the exact relationships be-

tween the threads, shuttle and treadles of a loom to produce a desired design. After coding this "recipe" in the borders, the traditional weaver must then translate these instructions point by point into a design by painstakingly filling in the appropriate blocks on the graph paper.

This cloth diagram indicates the exact interweave pattern of the warp threads and the weft threads. Each square on the graph paper represents a warp/weft crossing, being white if weft crosses over warp and black if warp crosses over weft. While this system clearly indicates the design, Huff said, it doesn't look at all like fabric.

The unique line-drawing capabilities of the plotter inspired Huff to consider the possibility of a more representative diagram that would use lines to represent the individual warp and weft threads and breaks to indicate where some threads crossed under others.

The figures shown above illustrate

the ultimate development of this theory.

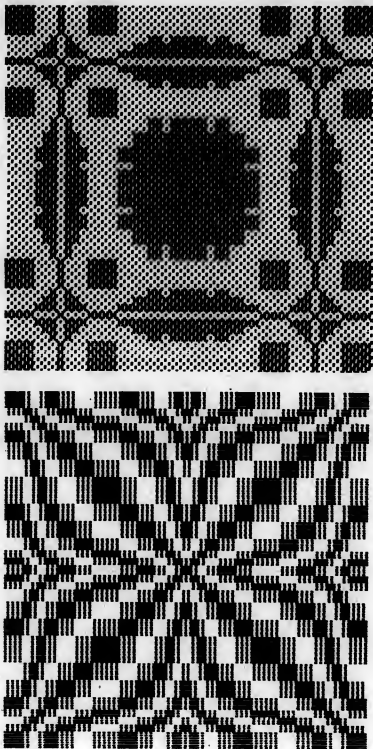
Noting the interesting effect created when only the weft threads had been plotted, Huff considered the results of plotting very heavily only the weft pattern, thus simulating the appearance of weaving systems where a dark weft forms a pattern against a light background warp. It was this technique that produced the artistic designs illustrated here.

Three-Part Input

Huff's system utilized keypunch card input, which just as easily could be written out at a terminal, she said. There are three parts to the input instructions, each corresponding to one of the three parts in a manually produced draft — that is, the tie-up, threading and treadling instructions.

These instructions can be very easily expressed numerically, Huff said. The

(Continued on Page 20)



Programmer/Weaver Uses Plotter as Design Aid

(Continued from Page 19)

computer reads the input, applies the program's algorithm to the data and generates a tape containing instructions for the plotter.

The program works in two ways: it can draw both the warp and the weft patterns, giving a picture of the structural properties of the design; or it can draw only the weft, which produces a more "arty" effect, according to Huff.

"The designs showing both the warp and the weft perhaps have more educational importance in learning how to make threads interact to give different textures — to make something light and puffy or hard and rug-like," she explained. The weft-only designs are more indicative of pattern or design than of structure.

One of the major benefits of using a computer in this way, according to Huff, is the time saved in creating each design. "I would never undertake manually a design which the plotter takes two hours to produce," she said.

It takes between five and 20 minutes to prepare the data for a computer design, whereas manually it would take about four hours to work out on graph paper, she said.

While her computer-aided designs were originally created to help visualize weaving patterns, Huff now considers much of the product coming out of the computer as an end product in itself. Several framed designs grace her office wall and a number of them have been used as pamphlet cover designs and newsletter decorations.

"Originally I didn't think of it as art at all — I was just doing weaving design," Huff said. "I think the images that are produced are interesting and they give me a certain amount of pleasure, but I'm not expressing any great art philosophy or philosophy of life through these images."

"I think of myself as a crafts-person, and it fits with my weaving interest very well," she added.

A year ago Huff lost access to a computer system when she moved to Intermetrics. She had developed the program on an IBM 370/158 using a California Computer Products, Inc. 663 drum plotter and utilizing the language of PL/1.

Huff is currently looking into the possibilities of using a home computer

system which, she said, could work in two ways — by allowing interaction with a CRT by using a special interface that would drive a small loom while she changes yarn colors and manipulates the threads.

While Huff considers her computer designs more "fun" than art, "she does see some future for the use of computers as an aid to the artist. 'I think there is one thing interesting that a computer can do, and that is to help an artist go more directly from the conception of what he would like to produce to that end product.'

"I see the computer as being a tool of the artist, just as oil paints, canvas and pen brushes are to painters," Huff said.

While she is enthusiastic about the positive aspects of such computer usage, Huff conceded that the computer output's lack of both color and texture — qualities germane to cloth weaving — point up its limited capabilities for producing art.

Huff hopes to continue using computers to help in hand-weaving design and is hopeful that she will again have access to a system. "I see it as a kind of interactive process where the computer can provide a rich visual environment for the weaver and perhaps do automatic things as well, but I'm principally interested in supporting weaving design by visual techniques, whether with plotter methods or CRT methods," she said.

Security Called More Than Issue Of Illegal Access

ATLANTA — Data security means keeping unauthorized people out of a computer system and protecting the system against fraud. But it also means protecting the computer from careless or malicious acts and "making sure a DP system will do what it's supposed to do," according to Dean R. McKay, IBM senior vice-president.

Speaking at a recent meeting of the Bank Administration Institute here, McKay said that while a large part of the responsibility for data security rests directly with the user who must employ available hardware and software technology, controls and physical security measures, IBM recognizes its responsibility as well.

McKay described steps IBM has taken over the past six years both in equipment and programming to help customers improve security in their systems, including new storage techniques, operating systems and cryptographic techniques.

IBM has built "journaling capabilities" into a number of its products to help create an audit trail that enables management to fix accountability and take corrective action, he noted.

McKay said these techniques were designed largely to prevent unauthorized people from accessing a system. However, he pointed out, IBM's experience has been that most problems were caused by authorized people and were the result of error, not intent.

Eighty-two percent of the people who use IBM equipment believe that errors and omissions are the greatest threat to the overall integrity of their systems, according to McKay.

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Two HIS User Groups Plan Chicago Meets Next Month

CHICAGO — Two Honeywell user groups — one independent and one sponsored by Honeywell Information Systems, Inc. — will meet here the week of April 10. The Independent Honeywell Group (IHG), soon to be incorporated under the name In-House, Inc. (IHI), will meet on April 10 at the O'Hare Hilton Hotel. The Honeywell User Group/Small and Medium Systems (HUG/SM5) will meet April 10-13 at the O'Hare Sheraton Hotel.

A special feature of the IHI meeting will be a six-hour maintenance seminar for in-house engineers, to be divided into five separate classes throughout the week, according to A.J. Nowotny, IHI president. Nowotny said the classes will be tailored to the interests of the participants. He asks that applicants, when registering, indicate their areas of interest, such as PC board technique, computer theory or computer room maintenance procedures.

Cost of the maintenance seminar to be held at a member site, is \$300. Additional information is available from Nowotny, who is president of Compunetics Corp., P.O. Box 486, Falls Church, Va. 22046.

Highlights of the HUG/SM5 meeting will include an April 10 session on management and motivation, led by Leo McManus of Leo McManus Co., Inc., of Worcester, Mass. At a forum on the afternoon of April 12, users will be able to address questions to HIS representatives.

Fees for the HUG/SM5 conference

are \$110 for nonmembers, \$100 for preregistered nonmembers, \$70 for the first preregistered member from one company and \$65 for subsequent pre-

Societies/ User Groups

registered members from the same company.

Further information is available from HUG/SM5 secretary Stephen Wiatrowski, Reed & Barton Co., 144 W. Britannia St., Taunton, Mass. 02761.

Older HIS Systems Supported

FALLS CHURCH, Va. — The Independent Honeywell Group (IHG), soon to be incorporated under the name In-House, Inc. (IHI), is an association of owners and users of older Honeywell Information Systems, Inc. small and medium-scale computer systems.

IHI was originally organized to help members wishing to handle their own maintenance — or at least maintain their systems without HIS maintenance contracts — by mass purchasing and stockpiling of repair parts, according to IHI president A.J. Nowotny.

IHI is presently seeking to organize maintenance chapters in various cities across the country. An IHI member would be eligible to

take advantage of the local maintenance chapter, which would retain a full-time specialists engineer, Nowotny said.

Nowotny feels a major benefit of IHI has been in the parts area. "In the past, before I began to meet people in the same situation in independent companies, I was kind of behind the eight ball, not knowing whether I'd be in trouble if I needed a major part," Nowotny noted. "Now I'd have no problems whatsoever with that. There are parts to satisfy any need," he added.

The subscription fee for IHI is \$150, with annual dues of \$100. Nowotny is president of Compunetics Corp., P.O. Box 486, Falls Church, Va. 22046.

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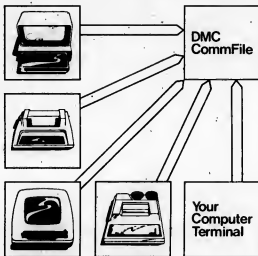
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NCC Attendees Get Travel Aid

MONTVALE, N.J. — A travel service has been established to accommodate attendees of the 1978 National Computer Conference (NCC) to be held June 5-8 in Anaheim, Calif.

The service, available only to NCC 78 attendees, reportedly offers savings of up to 40% on airfares from New York, Philadelphia, Boston and Washington airports, a spokesman said. Individual savings are also extended to travelers from all major cities to the West Coast at a reduction of 28%, he stated.

The service was also designed to arrange discounts for special events group, night coach passengers and seven-day excursion travellers, the spokesman noted.

Information concerning air travel packages as well as applicable regulations can be obtained by calling the travel service toll-free at (800) 556-6882.

Call for Papers

EDISON 78, Sheraton International Hotel, Arlington, Va. Sept. 24-27, 1978.
The theme of the conference is Electronics Key to the Information Age. The six technical areas to be covered are: military and civil C-3 systems, radar/transport systems, satellite communications, electro-optical systems and technology, space systems, information systems and new frontiers in electronics.
Send an abstract of about 200 words by March 17 to A.E. Sebati, Edison 78, technical program chairman, WWMCCS System Engineering Organization, 8th & Cornhouse Road, Arlington, Va. 22204.

Calendar

April 5-7, San Francisco — Word Processing: Guidelines for Planning, Designing and Implementation, sponsored by Datapro Research Corp. Contact: Don Welscher, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held in New York April 19-21.

April 10-12, Tulsa, Okla. — 1978 International Conference on Acoustics, Speech and Signal Processing, sponsored by the Institute of Electrical and Electronics Engineers (IEEE). Contact: IEEE, 6411 Chillum Place N.W., Washington, D.C.

April 10-13, New York — Eighth Conference on Computer Audit, Control and Security, jointly sponsored by the Institute of Internal Auditors, Inc. (IIA) and Automation Training Center, Inc. Contact: Conference Registrar, IIA International Headquarters, 249 Maitland Ave., Altamonte Springs, Fla. 32701.

April 10-13, Chicago — Data Entry Management Course, sponsored by American Management Associations (AMA). Contact: AMA, 135 W. 50th St., New York, N.Y. 10020.
April 11, Boston — Data Catalogue Users Group Conference, sponsored

by Synergetics Corp. Contact: Alexander R. DeVito, President, Synergetics, One Delangelo Drive, Bedford, Mass. 01730.

April 12-14, San Francisco — Applied Data Communications System, sponsored by the Institute for Professional Education (IPE). Contact: IPE, Suite 601, 1901 N. Fort Myer Drive, Arlington, Va. 22209. Also being held in Chicago May 7-9 in Washington, and July 12-14 in San Francisco.

April 16-18, New Orleans — Seventh Annual Symposium, EFT: New Horizons, sponsored by Payment Systems, Inc. (PSI). Contact: PSI, Suite 2814, 100 Peachtree St., Atlanta, Ga. 30303.

April 16-19, Washington, D.C. — National Information Conference & Exposition (Nice III). Contact: Nice Headquarters, Suite 904, 4720 Montgomery Lane, Bethesda, Md. 20814.

April 17-18, Atlanta — Privacy and Security, sponsored by the Theorem Institute. Contact: Michael E. O'Neill, vice-president, Theorem Institute, Suite 590, 1737 N. First St., San Jose, Calif. 95112. Also being held in St. Paul May 18-19 and Washington, D.C., June 8-9.

April 17-19, Palo Alto, Calif. — Cryptography and Data Security, sponsored by Martin E. Hellman Associates. Contact: Hellman Associates, 730 Alvarado Court, Stanford, Calif. 94305.

April 17-19, Chicago — 1978 Deltek International User's Conference, sponsored by Deltek, Inc. Contact: Sharon Trube, Inc., Suite 50, O'Hare Aerospace Center, 9950 W. Lawrence Ave., Schiller Park, Ill. 60176.

April 17-19, New York — Computer Performance Measurements: Tools and Techniques for Increased System Productivity, sponsored by Datapro Research Corp. Contact: Don Welscher, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

April 18-19, Phoenix — Fourth Annual Computer Security and Privacy Symposium, sponsored by Honeywell Information Systems, Inc. Contact: Jerome Lobel, HIS, P.O. Box 6000, M/S K95, Phoenix, Ariz. 85005.

April 19-21, Denver — Distributed Minicomputer Networks, sponsored by the Institute for Professional Education (IPE). Contact: IPE, Suite 601, 1901 N. Fort Myer Drive, Arlington, Va. 22209. Also being held in Chicago May 17-19, Washington, D.C., June 21-23 and San Francisco July 26-28.

April 19-21, Washington, D.C. — On-Line Systems Audit Controls, sponsored by the Institute for Professional Education (IPE). Contact: IPE, Suite 601, 1901 N. Fort Myer Drive, Arlington, Va. 22209. Also being held May 22-24 in Chicago, June 21-23 in Washington, D.C. and July 19-21 in San Francisco.

April 19-27, Hannover-Messe-land, W. Germany — 1978 Hannover Fair. Contact: Schenkers International Forwarders, Inc., Suite 1867, One World Trade Center, New York, N.Y. 10048.

April 20-21, Commerce, Texas — 1978 Computer Users Conference, sponsored by East Texas State University. Contact: Donna Hutcheson,

Computer Users Conference Coordinator, East Texas State, Dept. of Computer Science, Commerce, Texas.

April 20-21, Hartford, Conn. — New England — Computer Conference (Necom 78), sponsored by the Hartford Chapter of the Data Processing Management Association. Contact: Association of Data Processing and Computer Management, Hartford Chapter, P.O. Box 562, Hartford, Conn. 06101.

April 20-21, St. Cloud, Minn. — 11th Annual Small College Computing Symposium, sponsored by St. Cloud State University. Contact: Randy Kolb, Director, Academic Computer Services, St. Cloud State University, St. Cloud, Minn. 56301.

April 20-21, Chicago — Structured Problem Solving: Bringing Productivity Improvements to DP, sponsored by Datapro Research Corp. Contact: Don Welscher, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

April 24-26, Washington, D.C. — People: The Secret of Effective Systems Analysis, sponsored by the Institute for Professional Education (IPE). Contact: IPE, Suite 601, 1901 N. Fort Myer Drive, Arlington, Va. 22209. Also being held in San Francisco May 24-26, New York June 21-23 and Chicago July 17-19.

April 24-26, Atlanta — Forum's Spring Conference. Contact: TRW, 4902 Tollview Drive, Rolling Meadows, Ill. 60008.

April 24-26, New York — Automation of Manufacturing Operations, sponsored by New York University School of Continuing Education. Contact: Heidi E. Kaplan, Dept. 14NR, New York Management Center, 360 Lexington Ave., New York, N.Y. 10017. Also being held in San Francisco July 7-9, Aug. 28-30 in Chicago, and Oct. 18-20 in Toronto.

April 26-28, Geneva — Seventh International Computers in Banking Seminar, sponsored by the Institut de Recherche Interbancaire. Contact: Institut de Recherche Interbancaire, Siegfried Social, 5, Rue Quentin-Bauchart 75008, Paris, France.

April 26-28, Washington, D.C. — Effective Leadership of Data Processing Projects, sponsored by the Institute for Professional Education (IPE). Contact: IPE, Suite 601, 1901 N. Fort Myer Drive, Arlington, Va. 22209. Also being held May 22-24 in Denver, June 19-21 in Washington, D.C., and July 24-26 in Boston.

April 28-30, Long Beach, Calif. — Percomp '78. Contact: Percomp '78, 1833 E. 17th St., Santa Ana, Calif. 92701.

April 30-May 3, New Orleans — Eighth Annual International NCR Users Conference, (Nucron 78) sponsored by the Federation of NCR Computer Users. Contact: Federation of NCR Users, Nucron 78, Box 2015, Kettering, Ohio 45429.

April 30-May 3, London, Ont. — 1978 College & University Machine Records Conference (Cunrec 78), sponsored by the University of Western Ontario. Contact: Bruce G. Hartwick, University of Western Ontario, Cunrec 78, Stevenson-Lawson Campus, London, Ont., Canada N6A 5B8.

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IN DEPTH IN DEPTH

The Ten Great Software Myths

By Werner L. Frank

MYTH NO. 4

Software outlasts hardware.

Myth No. 3 seems to also support the notion that software outlasts hardware. Indeed, how often does a user replace his software on a specific piece of computing hardware?

Unfortunately, the impetus for changing software is a change in hardware. The latter action usually is taken to keep up with the technology or the pressures of the vendor's salesman. Even with a hardware change, the old software is often retained without change, if that is possible, as was the case of emulation of IBM 1400 series programs on the IBM 360 line.

But it isn't hardware so much that decays in time; rather, it is software.

Software needs more maintenance and tender loving care than does hardware. This peculiarity, and possible anachronism, of the material having a longer lifetime than the abstract is, nevertheless, true.

Software deteriorates for a number of reasons, among which are:

- Recognition of original design faults.

- Discovery of bugs/errors.

- Evolution of a learning user who develops his understanding of the "real" problem and upgrades his requirements based on operational experience.

- Changes in the application environment as a result of business, accounting and government requirements.

- Changes in computer technology — both systems software and hardware. Hence, armed with this understanding, the smart user will develop cost-effective strategies to extend the half-life of his software on his current hardware by:

- (1) Implementing applications so they are built for change.

- (2) Maximizing use of modularity in

Software represents a growing proportion of total data processing expenditures.

* * *

Software is (necessarily) expensive.

* * *

Software must follow hardware.

* * *

Software outlasts hardware.

* * *

Software needs continuing change.

* * *

Software productivity can be enhanced.

* * *

Software product manufacturers are more efficient producers.

* * *

Software must satisfy the user.

* * *

Software systems require a data base management system capability.

* * *

Software is the result of programming.

* * *

The executive vice-president of Informatics, Inc. thinks its time to debunk some common myths about software. Last week, Frank attempted to clear up three of those misconceptions; this week, he explores seven more.

the architecture.

(3) Evolving the software system over time, employing a hierarchy of implementation systems that allow for quick and dirty solutions which can be plugged in and taken out, as well as provide the capability for more carefully coded portions that must optimize performance.

But, most importantly, the user must recognize he is no more committed to existing software than to existing hardware. The fact that a user is already operating with a specific implementation language, retrieval system or payroll program should not foreclose his option of replacing such software whenever a suitable improvement becomes available.

This user is obligated to spend as many resources continually investigating software alternatives as resources budgeted to keep up with the hardware technology.

MYTH NO. 5

Software needs continuing change.

This, on first glance, seems to contradict the position taken by Myth No. 4. In fact, we have shown software to be vulnerable to decay if not carefully nurtured.

In a recent *Computerworld* article, however, Dr. Ruth M. Davis scored this myth. Davis was quoted as stating to the annual management conference of the Association of Data Processing Service Organizations, "We've sold the world on the concept that frequent changes in software mean improvements in processing."

The negative impact of changes was illustrated by stating that a modification in a small portion of operating system software can be expected to induce 10 new errors.

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THE TEN GREAT SOFTWARE MYTHS

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Given that correcting errors in operational software often costs 10 times more than catching errors during design and coding, the consequences and rippling effect of "software tinkering" are apparent.

Limiting access to software, and hence the ability to make changes, leads to advocacy for hard-wired software and software generators, as well as "packaged" software products with which only the object code is supplied, the source code being maintained by the originators.

While upgrading of software over time is a necessity, the control of such changes is even more of a requirement.

MYTH NO. 6

Software productivity can be enhanced.

Somewhat, but not much! The small, incremental changes that accrue because of technological advances are offset by the continued labor-intensiveness of the programming trade (or

art) and the ever-present inflation rate. There is, of course, a basic problem in how to measure productivity — be it lines of code per hour or some unit throughput processing. But that is an entirely different problem, one with which the software engineering groups must wrestle.

The issue of measurement is well identified in *Data Processing in 1980-1985*, written by T.A. Dolotta, M.I. Bernstein, R.S. Dickson Jr., N.A. France, B.A. Rosenblatt, D.M. Smith and T.B. Steel Jr., where it was stated in reference to evaluating productivity:

There is no available data on how much software is presently (or ever) has been maintained, nor do we have any idea of what the growth rate of this "inventory" of software is, not of this inventory's distribution in terms of size and kind. Equally unknown is the amount of software that is discarded from the inventory or that never becomes part of the inventory.

We also do not know how much software is produced in support of developing an application or a system. If we are ever to properly measure the productivity of programmers, we must know how much undeliverable or noninstallable

software is created for the various kinds of software that is delivered and installed.

The reason for concern about productivity is expressed in the conclusion of this book, which states productivity must increase by a factor of 10

"The user must recognize he is no more committed to existing software than to existing hardware."

by 1985 if 1985 application products are to be solved using computers.

There seem to be two important ways to increase software productivity. One, discussed for almost two decades, is the higher level implementation languages. The second is control of software production, which is aimed at increasing software reliability.

The *Data Processing in 1980-1985* study had this to say about the prospects of the salvation of productivity by higher level languages:

As new techniques have come into the programming world, they have been touted to contain the necessary ingredients to solve the cost (productivity) problem, sometimes to the point that they have become fads. Higher level languages were the first purported solution. There is no denying that they have been helpful, but it is not true that if a little bit helps, a lot more will be much better. There is no longer any reason to believe that a newer, better, general-purpose programming language will make a measurable difference in programming productivity.

This is not to say that all further language developments should stop, but just that it should be understood that there is no magic in new programming languages, that the best we can expect are small, incremental gains, and that, as such, new languages are acceptable (and sometimes even welcome), provided that their cost is not excessive.

Improvements in procedure-oriented languages such as PL/I, Cobol and Fortran do not have the potential for improving productivity by as much as a factor of 2, while an improvement of at least one decimal order of magnitude is a necessity, and more would be desirable.

But the real issue is not the availability of more powerful languages (there are some that claim improvement over Cobol by factors of 5). Rather, it is the

(Continued on Page 26)

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THE TEN GREAT SOFTWARE MYTHS

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IN DEPTH

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reticence of decision makers in DP shops to consider the new and continue to cling to their Fortran and Cobol. Some diehards will still stand by assembly coding, even in this, the 30th year of the computer age.

Current practitioners may not know, and old-timers may choose to forget, how hard it was to "convert" the professional programmers to Fortran in the mid- and late 1950s. Cobol came on the scene in the early '60s; it took eight years to gain wide acceptance. What fundamentally new implementation language has emerged and received wide reception in the last 15 years?

Turning now to the second great hope—software production control—we note this approach would have us organize or reorganize away the problem through such modern techniques as top-down, structured programming, etc.

But, as is often the case, different organizations and different philosophies of operation can produce equal results. Further, the native capabilities and commitments of individuals appear to

be more significant, if any, software productivity enhancement. We have, unfortunately, good company with

"While upgrading of software over time is a necessity, the control of such changes is even more of a requirement."

this position as the authors of *Data Processing in 1980-1985* concluded:

Productivity of implementors could well remain one of the primary limitations to the industry's growth and to its ability to supply needed services.

MYTH NO. 7

Software product manufacturers are more efficient producers.

Of course not! The software houses operate under the same severe man-

agement and production limitations as the typical users. They have problems in requirements analysis, specification writing and, even worse, problems in implementation.

In fact, code produced for 100 or 500 users must be by an order of magnitude more soundly structured and quality controlled than code for a single user. Documentation, especially, must be even more carefully produced and with greater detail and clarity.

The magic is not that the professional software producers can do it better or operate with higher productivity. It is that they can do it cheaper and more effectively because of these factors:

- The product is typically two or three generations beyond a first attempt made sometime earlier at another's expense.
- The cost is spread over many users.
- The community of users provides the richest sounding board and source of continuing input leading to an ever-better product. This often yields benefits to the masses as a result of the demands of leading-edge practitioners who are more willing to take risks.

MYTH NO. 8

Software must satisfy the user.

This seems to conform to the popular notion that the customer is always right. But an open-door or overly responsive policy in regard to users can be the perfect invitation to disaster in building software.

Certainly, we do not advocate placing the responsibility for specifying functional requirements for application software on any party other than the user. Even through this stage of software implementation, the DP professional can make substantial contributions by always keeping in balance the cost/benefit equation, which relates scope of solution to practicality of implementation.

The classical 80/20 trade-off is operative in software implementation as it is in most situations, which is to say that the last 20% of what users want can take 80% of the effort.

To be more specific, the user's needs and wants should be heard but, in return, the cost and risk should also be made clear.

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THE TEN GREAT SOFTWARE MYTHS IN DEPTH

Despite the present trend of giving the user exactly what he wants, DP professionals should endeavor to persuade the user as follows:

(1) Provide the user with a candidate solution to be used as a checkpoint or benchmark, rather than present an open invitation to include everything and anything the user ever wanted.

(2) Lead the user to existing solutions (e.g., packaged software) which may be general-purpose, and not necessarily customized or an exact fit to the way the user is currently conducting his business or wants to conduct his business.

MYTH NO. 9

Modern software systems require a data base management (DBMS) capability.

A current test of the adequacy of a software application system and the progressiveness of a computer facility is to ask and hope for a positive response to the question, "Are you employing now, or will you be able to in-

terface in the future with, a data base management system?"

The DBMS is a tool that can be very useful in many a DP environment, but let the requirements of the user determine the need! In fact, "DBMS" is really a generic term referring to a number of general-purpose systems software implementations to handle storage and retrieval of data elements for user-written application programs.

Such user programs will refer to the data, through the DBMS, on a logical basis, while the DBMS will address the data on a physical basis. Given this, the DBMS embodiments will possess typical call and processing features, as well as access characteristics, which satisfy various response criteria — from very quick for inquiry, rapid for interactive and delayed for batch.

Many file and access systems which have existed for over a decade satisfy this general definition. Thus, there is no panacea in the more modern DBMS. Rather, the user should be warned that the advanced capabilities of more recent DBMS may well tax his:

• Hardware resources.

- Overall throughput performance.
- Understanding of operation.
- Ability to use features.
- Comprehension of complex file structures.

"But the real issue is not the availability of more powerful languages ... Rather, it is the reticence of decision makers in DP shops to consider the new and continue to cling to their Fortran and Cobol. Some diehards will still stand by assembly coding, even in this, the 30th year of the computer age."

For example, many users are not ready to integrate files from their various elements of operation, nor does it follow that elimination of data redun-

dancy through a DBMS is necessarily good. In fact, many DBMS features raise new questions and trade-offs, such as memory utilization, storage trade-offs, access time and performance. To this must be added the increasing problems of data and system security.

In witness to this position, we quote from Gilb's column in the Sept. 8, 1977 issue of the *British Computer Weekly* that took the following position:

"Most users are either too small to justify the fixed overhead costs, or too large to justify the cost multiplier for IMS or Coday-like data base software. Presumably there is a group in the middle, but nobody has convincingly documented it."

MYTH NO. 10

Software is the result of programming.

This last of the 10 great myths might well be the most dangerous one, a myth which pales the significance of (Continued on Page 28)

under control

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THE TEN GREAT SOFTWARE MYTHS IN DEPTH

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the other nine. To fully appreciate the point being made here, we refer to the "software life cycle" introduced by B.W. Boehm in a May 1973 *Data-ation* article that identified seven important steps in software creation:

- (1) System requirements
- (2) Software requirements
- (3) Preliminary design.

- (4) Detailed design.
 - (5) Coding and debugging.
 - (6) Testing and preoperation.
 - (7) Operation and maintenance.
- The key to understanding where the real limits are in software development is to realize that ultimately most of the costs and most of the procedures are associated with operation and maintenance, not with the programming itself

(steps 2 through 6). It will be recalled, as stated earlier, that some 60% of the ongoing software efforts are now committed to maintenance and this amount threatens to increase as new applications emerge and as more complex systems are developed.

The success or failure of the seventh step, as highlighted by Boehm and others, is highly dependent on the ef-

fort expended in the first step — defining the problem (not the program!) to be solved.

Thus, more attention to the user requirements and the ultimate operation of the planned automated system may just change the software environment enough so that we might begin to entertain 10 new myths.

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The new age of computers produces entry level computer facilities under \$10,000 thereby opening the door for new users. These new users are materializing at a fantastic rate. They range from the small business that can now afford a computer for the first time to the small department within a large corporation that is now able to justify computerization of crucial systems.

People make the new tools work.

Technology is moving quickly, but it takes people to make these systems work. Systems professionals from the Project Manager to the veteran Programmer to the Programmer Trainee are still the keys to realizing the user's requirements into a functioning application system. The process of "making" a system now costs more in the cost of the hardware needed to run it.

The different minis, mainframes, and micro often use different tools to develop similar applications systems. Standardization is diminishing. Confusion is on the rise. And, the need for reliable outside assistance to avoid problems with the new tools is growing.

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Werner L. Frank is a co-founder and executive vice-president of Informatics, Inc., an independent supplier of custom and proprietary computer software products and services based in Woodland Hills, Calif. He is the author or co-author of 19 published papers on the numerical analysis and development of on-line, terminal-oriented software.

A graduate of the Illinois Institute of Technology and holder of a master of science degree in mathematics from the University of Illinois, Frank spent the early years of his professional life at the Thompson Ramo Wooldridge Corp., where he directed the development of some of the first trajectory and orbit determination computer programs for space vehicles.

At Informatics, Frank has been responsible for the development of several major divisions engaged in implementing military and commercial information systems that emphasize on-line technologies employing communications, data management and terminal devices.

He also headed a team that investigated the feasibility of forming a joint venture enterprise with the Equitable Life Assurance Society to provide software and data services to the insurance industry. Equimatec, Inc., the result, later acquired Informatics and the two merged.

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Editorial

Interim Relief a Bad Idea

The Justice Department will soon decide whether to ask for interim relief when it finishes presenting its antitrust case against IBM, according to the head of the department's Antitrust Division, John H. Shenfield (CW, March 6).

Interim relief would entail some penalizing of IBM for its alleged monopoly practices before the firm presents its defense to Judge David N. Edelstein. Such a measure would be reversed should IBM win its suit and, while invoked, would not mean IBM was guilty of monopolizing the computer industry.

Specifically, interim relief might require IBM to make interface specifications of new products available to competitors when the

products are announced or to make its installed base public by product and country on a quarterly basis to allow an accurate census of the industry to be made, according to the Computer & Communications Industry Association (CCIA) executive director, Jack Biddle.

Shenfield has said that he's very concerned about the trial delay an interim relief hearing would impose, and his concern is warranted. Much additional expense in time and taxpayers' money could result from the appeals IBM would probably make in the event relief were granted, following what would most likely be a slow and costly relief hearing.

For this reason, relief should not be granted now.

Follow This Leader

Users who have been unable to obtain mainframe contract provisions that match or nearly match their long- and short-term growth plans should look carefully at what Honeywell Information Systems, Inc. is doing with its contracts for the remodeled Level 64 line.

Users are now offered the choice of multiple and mixed terms on a single lease (CW, March 6) while receiving limited price protection in the form of an HIS-guaranteed maximum 5% escalation per year.

For example, users can mix, on a single contract form, one-, three-, five-, six- or seven-year terms on a unit-by-unit basis. In addition, HIS claims price continuation at the end of lease terms with no automatic revision to one-year prices. These options should be of great value to users who are faced with a rapidly growing or changing operation.

Users' requirements for flexibility when deciding how long to lease individual pieces of equipment has been badly overlooked in the quest for "universal" or "standard" contracts and stable lease bases. While it is unquestionable that both parties in a lease cannot always have everything that they desire, it is important that users be able to meld lease terms with their long- and short-term operational expectations.

It is certainly refreshing to see one of the mainframes unwrap a lease program that appears to have some real benefits for the users. Hopefully, HIS will soon adapt this contract concept across its entire product line. And, if users are really forgoing the HIS mainframe and a trend toward mainframes will follow.

however, rejected "at this time" the Justice Department request that IBM be forced to either reconstruct the data base or pay justice to reconstruct the files.

Eight Years Ago March 18, 1970

WASHINGTON, D.C. — The National Academy of Sciences began an investigation into the extent of computer data hoarding and the impact on individual freedom and due process of law.

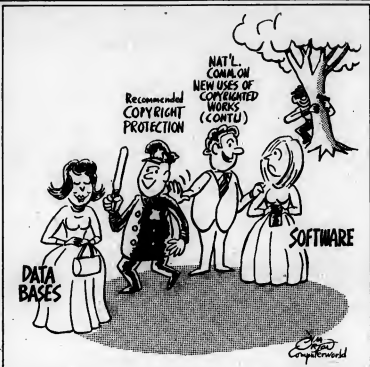
COLUMBUS, Ohio — In a move described as a "major victory for the computer industry," Ohio Bell Telephone Co. rescinded a proposal that could have increased costs to time-sharing users by 400%. Ohio Bell decided to withdraw proposed Information System Access Line (ISAL) designations from intrastate lines being utilized by time-sharing firms that had fought to block the plan.

Data Past

Five Years Ago March 14, 1973

WHITE PLAINS, N.Y. — IBM added three models to its 3420 magnetic tape system that could record data at the "densest recording capability yet offered," according to the company. Using a method called Group Coded Recording (GCR), the drives could handle tapes containing a data density of 6,250 byte/in., compared with 1,600 byte/in. on earlier models of the 3420.

NEW YORK — IBM and its lawyers were sharply reprimanded by a federal district court judge here last week for their role in the destruction of the index or computerized data base compiled in the IBM vs. Control Data Corp. antitrust case. Chief Judge David N. Edelstein ruled IBM had violated a pretrial order he had issued on March 16, 1972, "in that it procured the destruction of a data base created by attorneys for [CDC]." The judge,



... And If You Get in Trouble, Dear, Just Bat 'Em With Your Eyelashes!

Letters to the Editor

Breaking Out of Chinese Box

As editor of the pilot issue of Abacus, I wish Joe Rigo had gotten the facts straight before lampooning the proposed American Federation of Information Processing Societies (AFIPS) magazine "Societies Wrangling for Share of Readership," CW, Feb. 20.

Like Scientific American and Psychology Today, Abacus was created to bring the work of professionals to the attention of a broader public than can be reached by scholarly journals or trade magazines. We do not intend to steal away the readers of specialized publications or to publish watered-down versions of manuscripts that they might reject.

Right now, the computing profession is a Chinese box of enclaves within enclaves, whose denizens communicate mainly with their fellow specialists. Isn't it about time to begin telling our colleagues in other branches of computing — as well as scientifically literate laymen and decision-makers in the world at large — what we're doing?

William E. Boggs
New York, N.Y.

It's Not Standard Yet

There are several schools of thought about what type of data base management system (DBMS) provides the "best" data model and user facilities.

Computerworld has recently published articles by proponents of both Codasyl and non-Codasyl systems. I applaud this objectivity. But I must take issue with L. E. Townner's article "Non-Codasyl DBMS a Bad Choice for Users," CW, Feb. 6.

He stated, "In 1975 the [Codasyl] Data Manipulation Language [DML] was submitted to ANSI for standardization. It has been ac-

cepted and is likely to appear in the next update of the ANSI Cobol standard." It is true the Codasyl DML has been before ANSI committees for years, but it has not been accepted as a standard. According to people who are active on these committees, there is no consensus on this subject at this time, and a standard cannot possibly emerge for at least three years.

Even if ANSI does provide a DBMS standard some day, I'll bet that a significant portion of DBMS users will stick with their nonstandard systems for the advantages they offer!

Jane Jodeit
Software AG
Reston, Va.

About User Mini Ratings ...

In the Datapro Research Corp. survey on which the article "Users Rank Minis" (CW, Jan. 30) was based, the ICL System Ten received a poor rating, and I am writing to point out a serious error in your report.

Datapro canvassed opinions on equipment that was initially sold and installed by Singer (ICL acquired assets of Singer Business Machines in the U.S. in January 1977). In Datapro's detailed report on the ICL System Ten, it is quite clearly stated that the user ratings primarily refer to system performance prior to the ICL acquisition.

A further point worth noting is that ICL did not acquire the System Ten user base in the U.S. It did, however, buy the sole design rights for the onward development of System Ten and announced the enhanced ICL System Ten 220, last June.

Sue Croft
Public Relations Executive
ICL, Inc.
New York, N.Y.

How Far Will Computer Mail Battle Go?

By Jack Stone
Special to CW

"A scene at the battlefield, inside the maze of cubicles, women sit at their typewriters, punching thousands of names and addresses onto their lists ...

"All around them, the automatic robot typewriters hum a concerto of hollow plops and clicks and dings. The machines are programmed to repeat the senator's letter about every 90 seconds ...

"Soon in this cubicle, which houses the staff of Sen. Alan Cranston [D-Calif.], they will be fighting the war with new weaponry — a computer that will produce the same letter four times as fast."

These excerpts from Ward Sinclair's article "Computer Mail Speaks a Blizzard of Influence on Congress" [Washington Post, Jan. 28] barely raise the eyebrows of us hard-bitten DPs. After all, computer-generated letters (CGL) have been around for a long time. But what is rather fascinating is the writer's account of how he discovered that the mechanical typists are busily working both sides of the street.

"It has come to this: One of the American political system's simplest exercises, the letter to your representative or senator, has become a monster of sorts. Computers are talking to computers. Sophisticated mass-mailing techniques are producing a blizzard of cards and letters that threaten to engulf Congress."

Of course, what has happened is that well-heeled lobbyist organizations have introduced the miracle of computing technology to the political letter-writing process. They mass-mail to their constituents, enclosing a letter or card preaddressed to the recipient's own legislator and preprinted with a political message.

Thus, the idea of machine-produced letters has boomeranged on our beloved Congress. Not content to flail about in a sea of its own paperwork, it is now being drowned in a tidal wave of computer mail.

Rep. R.L. Mazzoli (D-Ky.) is seriously concerned. He said, "This mass mailing is about to wipe us out. It is easy to poke fun at, but I don't know how to respond. They use computer, we use computer. We've reached the crazy point of 1984 already. It is weird, upsidown, ex-fused anyway, we might as well save the 2% or 3% of the gross national product that is devoted to making CGL appear personalized."

In addition, each sender would have to submit a copy of its form letter for central registration and receive a federal code for it.

Phase 1: All CGL are encoded with a short character stream that identifies sender, addressee and form letter code. The computing industry will have to provide appropriate code imprinting and reading machinery. But this should present no real challenge to the ingenuity of

a system whose sophistication is marked by its stark simplicity. Let me introduce you to the Computer-Read Letter (CRL) system.

The system design is based on the maxim of the early technology developers: "Don't fantasize — com-

The Human Connection

puterize!" The uncontrolled flow of CGL has come about not because machines are used to generate the missives, but because of the lack of machines to read them.

The system is designed in phases:

Phase 0: A national standard for CGL must be adopted so that CRL can properly function — you know, letter size, paper grade, type font, that sort of thing. (Since nobody is fooling anyway, we might as well save the 2% or 3% of the gross national product that is devoted to making CGL appear personalized.) In addition, each sender would have to submit a copy of its form letter for central registration and receive a federal code for it.

Phase 1: All CGL are encoded with a short character stream that identifies sender, addressee and form letter code. The computing industry will have to provide appropriate code imprinting and reading machinery. But this should present no real challenge to the ingenuity of

our hardware engineers. They could certainly repackage some second-generation cast-off magnetic ink character recognition (MICR) gear and ship it back to the field.

Phase 2: As CGL are received for CRL processing, they are first opened by hand in the good old-fashioned style. Now here's the pivotal point of the system strategy: the letters are not to be read by staff personnel, but diverted for CRL processing.

The potential for output reports is mind-blasting. We would easily obtain the number of letters generated by form letter code and determine ayes and nays on a specific issue very quickly. We could group the constituents by geographical area and speed of response. We could generate cross-reference reports to show form letters mailed from each sending organization.

Phase 3: Code the envelope and forget the letter. 3a. Replace the envelope and letter with a coded card and no message. 3b. Replace the cards with tape sent directly from the CGL source machine to the Congressional machines. 3c. The two computers communicate with each other directly over the telephone lines. With this final strategy we have replaced CGL and CRL with CCC (computer-controlled correspondence).

Letters to Stone should be addressed to him at Suite 222, 233 Wisconsin Ave., N.W., Washington, D.C. 20007.

System Could Fulfill Century-Old Dream

Prof. Stuart Peterfreund of the University of Arkansas at Little Rock has probably never heard of Elizabeth Taber, a cheroot-smoking, forward-looking investor of the 19th century. Yet they have much in common. They shared the belief that a basic course in English grammar should be available to interested business people.

Peterfreund may hold the key to a century-old puzzle.

Taber left hundreds of thousands of dollars (now grown to around \$10 million) to charity, particularly to young people anywhere in the nation who desired to learn practical business English and arithmetic. She did not expect that the money could provide such a service at that time, and she was first and foremost a practical person. She had taught school in Massachusetts in 1819, when America remembered Washington as a man, not a legend. ~~As a result, the cash came from~~ her very conscious of the importance of education.

So she did what she could by starting a school, but she wanted more young people to be able to benefit

from the charity, "at least as long as there is a need for such learning" and if the means were there.

Peterfreund's Idea

There still is a need for such practical training. According to Peterfreund, University of Arkansas faculty members had recognized that need for years. "We kept getting all these nibbles from the community ... It has to do with the overall decrease in literacy," he explained.

The Peterfreund solution was to set up a "writer's hotline," manned from 9 a.m. to noon, Monday through Friday, by volunteer faculty members putting in an hour on a little-used existing phone line. People can get quick answers to grammatical questions. Those with basic language problems are also referred to English classes.

What is important about this service is that it uses a central source (the school and certain faculty members) to service a general group (anyone who can call the telephone number). This matches one of the requirements of Taber's dream. In addition, the service is on a voluntary basis, as needed. The only important question remaining is whether a computerized version of the Peterfreund solution could handle the training at a distance.

I think it can. There are now many computerized business arithmetic services, helping business people

keep accounts, price goods or services and write letters and brochures. A center with these services available could quickly and easily introduce a good training in business accounting to a teenager with a paper route.

A data base on applicants together with available courses by correspondence, cassette or time-sharing would provide individual yet automated review for spotting weaknesses and strengths. The combination of a personalized letter — keyed by date and activity — and auxiliary toll-free calling would attract participants.

The costs would not be enormous, either. Students who actually used

the facility on a continuing basis could be expected to pay for the services, perhaps by credit card. And the Taber money could provide both capital and basic operating expenses of at least \$200,000 a year.

The questions are, then, what sort of equipment would be used in 1980, what sort of training would the facility need and what sort of backup services would be needed to provide a national business English and arithmetic service?

Your suggestions might help Taber's dream come true.

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The
Taylor
Report
By
Alan
Taylor
CDP

Any Design Ideas?

1. What hardware would you use to run English and arithmetic courses and keep track of students' progress?
2. What software packages are suitable for elementary, practical business work?
3. What communications systems would you use?
4. Do you know of any such systems in use now or in the design phase?
5. If asked, would you help design a National Computerized Business Education System?

Please return completed form to Alan Taylor, c/o Computerworld, 797 Washington St., Newton, Mass. 02160.

Name _____ Position _____
Address _____

Or They'll Lose Sales

Small Systems Vendors Better Learn English

By Robert S. Yount

CW Staff

I've been reading Computerworld for several months now, and I've come to the conclusion that the small systems people are a lot further from recognizing their market potential than they realize. The volume market is small businesses, and they need not be engaged in technical work.

While the potential of this market is generally recognized, it seems no one has made an intelligent and serious effort to capitalize on it.

Before you say "Balderdash," let me tell you of my recent experiences in looking into acquiring a

system for my business. Advertisements for Commodore's PET and other microcomputers indicated that maybe we could use a computer to handle our accounting (general ledger, payroll, job cost, etc.) and some numbercrunching (mostly R&M predictions and some standard statistical work).

A perusal of the yellow pages located two local computer stores that handle prominent brands such as Polymorphic and Apple. The first visit to the local outlets was a disaster. A cheerful salesperson, obviously knowledgeable in 8080s, Klingsons and transmission rates, didn't have any idea of what size

system I would need.

In fact, he became less helpful when I explained in simple English what I wanted to do and the size of

that the salesman told me that if I could provide him with my programs, he could tell me how much memory I needed. From him I purchased two magazines and went home to study.

Don't Need Another Hobby

It's now three months later and I've learned to use terms like "file merging," "loop" and "bootstrap," but I'm having difficulty with the flow charts and any thoughts about writing a program are out of the question because I have other hobbies.

My mistake seems to be in wanting a tool, not a hobby. I'm an engineer (mechanical) trying to run a business, and I'm seeking something to simplify — not complicate — my life. I've decided to postpone the purchase of any computer until the sales reps for this equipment learn to speak English.

I may be missing the challenge of learning programming and all the intricacies of computers, as the salesman in a third store said, but he is missing the sale.

Perhaps some of CW's readers have been down the same road I'm traveling and can save me the trouble of reinventing the wheel. The following is a brief outline of what we'd like to do with a computer:

- Payroll (with standard deductions and job charges).
- General ledger, (three columns).
- Disbursements, (28 columns).
- Receipts (three columns).
- Job cost (30 percent) from payroll and disbursements.
- G&A, compute from above (period and YTD).
- Overhead, compute from above (period and YTD).

• Numerics: arithmetic, numbers to powers, e to powers, loop for iterative processes, roots, etc.

We now employ 15 people, but the computer should be capable of handling as many as 30 people for payroll. Incidentally, our accountant isn't a programmer either, so the CRT should provide prompting. Obviously, a printer is required.

Questions: How much memory (read-only and random-access) is needed? How should the data be stored: single floppy, dual floppy or cassette? Can a system that will do the accounting and number

(Continued on Page 42)

Reader Commentary

our operation. He did, however, sell me two books so I could learn his language and offer to propose a system when I developed a data flow chart.

Visiting the second store produced essentially the same results, except

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*Here's what Datapro Research Corporation writes about test data generators:

Surveys of data processing installations reveal that — • About one half of the personnel resources used annually are devoted to program debugging and testing • About 50 hours of computer system time per month is spent in support of program test and debug • A further 10 hours per month is lost by the average installation on reruns due to program failure.

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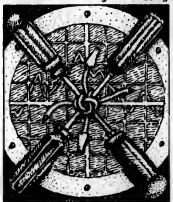
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Letters to the Editor

Too Much Protesting?

As the publishers of CNReport, we would like to respond to J.W. Johnson's letter [CW, Jan. 30], which took an exception to the Computerworld article "Fine Print Called Vendor Trick" [CW, Dec. 19].

The CW Commentary was based on an article that appeared in the September 1977 issue of CNReport entitled "The Psychology of Fine Print and Gray Ink." Interestingly, this article dealt with a major mainframe vendor's new form contract, as opposed to the "computer brokerage industry."

The vendor in question is now printing its contracts in the usual fine print, but with the additional new twist: The print has also been "screened" so that it appears grey, thus making reading more difficult. Since the article did not deal with Johnson's segment of the industry, we find it difficult to understand why she felt compelled to react to it. To paraphrase Johnson, perhaps Johnson "doth protest too much."

As far as a "campaign to besmirch the reputations of computer dealers and leasing companies" is concerned, it is the purpose of CNReport to make computer users aware of what is going on in the marketplace and to advise them of any activities, techniques, ploys, "tricks," etc., that may not be in their best interest.

Whether this type of information is construed as positive or negative probably depends upon which side of the table you're on.

The various computer vendors (including mainframes, dealers, brokers and lessors) are more than capable when it comes to telling their story to computer users. On the other hand, International Computer Negotiations, Inc. will continue, through the pages of CNReport, to provide users with facts, figures, warnings and suggestions it feels are appropriate.

Kenneth C. Brindle
Vice-President

International Computer Negotiations, Inc.
Winter Park, Fla.

Defends Standard Contract

"Users Alerted to Vendors' Negotiating Tactics" [CW, Jan. 30] left the unmistakable impression that vendors in computer-related industries are unscrupulous in their sales techniques. Your readers could benefit from a review of the following points in defense of the "standard contract":

"The purposes of a good contract is to secure agreement between parties, never to put one party 'behind the eight ball.'" It should by its purpose and intent ensure a harmonious relationship between the parties. For that reason, negotiating a contract with the intent to gain unfair advantage over the other party does neither party any long-term good. Since most companies in the U.S. rely on repeat business from their customers, it is vital that the contracts they write encourage fair-

ness and the customer's confidence.

• A reputable vendor will only put the minimum required to protect himself in his standard contract. Experience has taught him those things to which he would be ill-advised to commit himself and in so doing, protects his customer as well by ensuring his continued presence in the marketplace.

• Before a customer calls for legal counsel or debates every paragraph of a contract, he should stop and think about the contracts he writes with his own customers. Would he like to see such a procedure followed? What impact would this have on the way he does business?

• Why should the vendor involve senior management and legal personnel in the contract negotiations? Assuming that the customer is dealing with experienced sales personnel who know corporate policy, there is no need to involve others at the "corporate" level. Such involvement, particularly if both parties use legal counsel, will often make the deal less profitable for the vendor and far more expensive for the customer.

• Consider the source of the article, the CNReport, written by consultants. If there were no disagreements around, they would have difficulty making their living.

J. Norman Stauff

Director

Publications and Communications
Florida Software Services, Inc.
Orlando, Fla.

Ode to an Ace Programmer

This anonymous poem was passed around in one of the computer science courses at Sangamon State University last year by a class member who works for the State of Illinois. While the poem has nothing to do with compiler architecture, the subject of the course, it was well-received and I think others in the computer field may also enjoy it.

Thomas B. Knoedler

Springfield, Ill.

The Perfect Programmer

"No program is perfect."
They said with a shrug.
The client is happy ...
What's the little bug?
But he was determined.
The others went home.
He dug out the flowerchart
Deserted. Alone
Night passed into morning.
The room was cluttered.
With memory dumps, microfiche;
"I'm close," he muttered.
Chain smoking, cold coffee,
Logic deduction.

"He got it," he cried just
change one more instruction.
Then change two, then three more
After a year followed year.
And strangers would comment
Is that guy still here?
He died at the console
of anger and grief.
Next day he was buried
face down, nine edge first.
And his wife through her tears
Accepted his fate.
Said, "He's not really gone.
He's just working late."

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Disagreement With Towner

Non-Codasyl DBMS Not Horrible Prospect

By Stephen L. Robinson

Special to CW

In a "Non-Codasyl DBMS: A Bad Choice for Users" [CW, Feb. 6], L.E. Towner raised the specter of approval by the American National Standards Institute (Ansi) of the complete set of Codasyl recommendations for data base management systems (DBMS). Towner warned that a user "should not allow the vendor's salesmen to blind him to the fact that buying a non-Codasyl DBMS will return to haunt him when he can least afford it."

Strong words indeed! Without getting involved in a dispute over the merits of specific Codasyl and non-

Codasyl packages, I would like to question some of Towner's comments.

For example, the analogy with Cobol was a poor one. There are many "nonstandard" Cobol compilers around today.

Further, organizations which now conform to a standard subset of Cobol did not run out and rewrite all of their old Cobol programs. The vendors of nonstandard Cobol compilers have not stopped enhancing their products. Instead, we are now seeing a new wave of "structured Cobol compilers," which, for the most part, are also nonstandard.

Further, when Cobol appeared on

the scene, it was the only English-like high-level programming language around (unless one wishes to count IBM's short-lived Contran).

Reader Commentary

And, with regard to data base packages, there are alternatives around; more than 105 of all medium- to large-scale installations are using the alternatives. The Codasyl implementations are something less than 2% of such installations.

Therefore, the circumstances surrounding the "birth" of Codasyl Cobol are not at all similar to the birth of Codasyl standards for data base packages; since nonstandard Cobol systems are proliferating, why assume there would be no room for nonstandard data base packages?

Reloading/Reprogramming

Let us now consider Towner's contention that users will have to rewrite all their application programs and restructure all their data bases.

The latter would certainly be true — files will have to be unloaded and reloaded, much as many data base files have to be reorganized today. The cost here — a one-time cost — would be quite minimal.

The comment about reprogramming was too sweeping. While application programs written for some DBMS would need considerable revision, programs written for a large percentage of data base packages would require only minor revision.

This is especially true of "Codasyl-like" packages. For example, Cincom Systems Inc.'s total DBMS can be mapped rather easily into a Codasyl format. Master files in Total become CALC mode record types in Codasyl; master-variable entry file relationships in Total become set relationships in Codasyl; variable entry files become either VIA record types in Codasyl or, if the user wishes to get fancy, DIRECTS. Mappings for inverted packages are similarly straight-forward (if not quite so simple as Total-Codasyl mappings). The main problem here is taking the powerful inversion capability from a package such as Software AG's Adabas and having to implement it somewhat clumsily in Codasyl, which has nothing of comparable power.

For example, if I wish to "relate" all of my customer records by state in Adabas, I would simply make the state field a descriptor. I would now "request" all records from any state I wished.

To accomplish a similar task in Codasyl, I would have to establish a new record type, called STATE, even if I had no data of interest about states. I would then implement a set relationship between STATE and customer records.

Clumsy, but it could be done. I

(Continued on Page 42)

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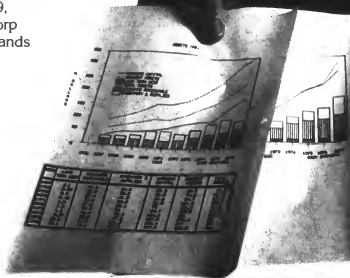
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Non-Codasyl DBMS Not a Terrible Problem

(Continued from Page 38)
doubt, however, that many inverted package users would be interested in giving up their descriptor or key capability.

Pursuing this issue further and hearkening back to the Cobol analogy, the reason Cobol has gained the acceptance it has (notice I said "Cobol," not "standard Cobol") is that it has demonstrable advantages over assembly-level coding and/or other higher level languages.

No such clearcut advantage exists for Codasyl today. Indeed, virtually every nonstandard DBMS has something to offer that would markedly enhance the Codasyl standard.

If a Codasyl data base standard is to gain overwhelming acceptance, it

will probably have to adopt features from other packages. This is going on all the time. A recent Computerworld article on a study by Infodyne [CW, Dec. 5] 1977 pointed out quite correctly that the major data base packages are beginning to resemble one another.

For example, Adabas is acquiring a CALC mode (a la Codasyl); IBM's IMS (or DL/I, if you prefer) added secondary indexing (a la the inverted packages); MRI Systems 2000 instituted a file link feature that is probably a first step to a generalized interfile subscheme capability.

Towner stated that the "non-Codasyl DBMS vendor will be forced to upgrade [emphasis mine]

his system to meet the standard." The term "upgrade" seems hardly appropriate.

There are many users of nonstandard systems who would not change for a free Codasyl system. Towner's article did not give credit to the vendors of "nonstandard" packages for their excellent efforts in the development of truly useful and efficient systems.

Worse, the article also did not give proper credit to the vendors of Codasyl packages. They, too, have invested in system development, yet are now acclaimed the "winners" by virtue of being Codasyl.

My crystal ball is not necessarily any clearer than Towner's, but it would seem that the argument for

Codasyl is not nearly strong enough to send Cincom, IBM, Insys Datacom, MRI, Software AG, etc. running for cover.

Of course, I could be wrong and Towner right. In this crazy world where people use operating systems that consume more resources than they save, where DP shops use 370/158s to simulate EAM logic and where people buy data base packages merely to replace Isam, anything is possible.

Robinson is an independent consultant operating as S.L. Robinson & Associates in Morrisville, Pa. He is also the author of the "Doto Bose Corner" articles which appear from time to time in the Software & Services section.

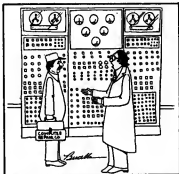
Vendors Should Learn English

(Continued from Page 32)
crunching be expanded if dual floppies are used, to provide word processing (like Xerox 800 or 850) capability?

The important question for the small systems is whether they can work with a customer who provides an expanded version of the intended use given above or whether they really need flow charts and programs. Do they have a standard software package for this type of accounting?

If the manufacturers can't communicate with the yard goods, liquor store and other business owners in plain business English, it's going to be a long time before equipment orders reach expectations.

Yount is president of QRC, Inc. in Silver Spring, Md.



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Newsletter Shows How Scoring Eases Evaluation of User Guides

By Brad Schultz
CW Staff

CHICAGO — Whether it is describing a system developed in-house or a package acquired from outside, the acceptance of a user's guide is determined by appearance, readability and how easy it is to use when seeking information, according to the editors of the Sandra Pakin & Associates Folio, a documentation newsletter.

Noting that "referenceability" is crucial to the worth of a guide, they outlined a scoring system for measuring this quality. In evaluating a guide — especially for a complex system — users should look for the following features, they said.

Section titles in the text. Score 10 points for at least three levels of text headings in each chapter (section, subject, topic). Five points if there are two levels of text headings; two points if there is one level.

Table of contents "lists section titles and page numbers in the order in which they appear in the

manual and shows the structure and organization of the manual."

Score 10 points if headings to at least the third level are present; five points if only two levels of headings are shown; two points for one heading level; no points if only chapter titles are present. Subtract 10 points if there is no table of contents.

List of figures, illustrations or tables "lists page numbers for figures, illustrations and tables." Score five points if present.

Index tabs "divide the manual into units to make it easy to locate chapters." Score 10 points for tabs having titles front and back; five points for titles on the front; two points when only numbers.

Chapter tables of contents "show detailed contents for each chapter. Each chapter table of contents immediately precedes the chapter text."

Score 10 points if all headings are cited; five points if headings are shown to the third level; two points if only two levels of headings are indicated.

Figure captions. Score five points if figures are both numbered and adequately titled.

Reference appendices "list information that the user needs to use the system, including error messages, special functions, codes, etc." Score 10 points if present.

Glossary of terms. Score 10 points if the number of glossary pages is 1% to 3% of the total count; five points for a limited glossary.

Index. Score 10 points if the number of index pages is at least 3% to 5% of the page count; five points for a limited index. Subtract 10 points if there is no index.

Pakin & Associates said the total point scores should be rated as follows:

- Excellent: 65 to 80 points. "You are giving your users a referenceable manual."
- Adequate to good: 35 to 65 points. "You are making attempts to provide the user with reference aids."
- Perfunctory at best: below 35

points. "You are shortchanging your users."

Published quarterly, Folio is available for an annual subscription rate of \$25, payable to Sandra Pakin & Associates, 6007 N. Sheridan Road, Chicago, Ill. 60660.

RT-11 Updated

MAYNARD, Mass. — Version 3 of RT-11, the smallest of Digital Equipment Corp.'s operating systems for its PDP-11, includes both extended hardware support and additional software features, according to a spokesman.

Version 3 is optimized for real-time and program development applications. It runs on systems ranging from the microcomputer based PDP-11/03 through the near-top-of-the-line PDP-11/60 with cache memory, he added.

High-level languages available with RT-11 include APL, Basic, Dibase, Fortran and Fortran IV. The Macro-11 language is also supported and the command sets permit a user to do such things as compile, link and execute a program, the spokesman noted.

One of the user options allows application programs running under RT-11 to access 124K words of main memory. Another supports 15 terminals through a foreground/background monitor facility, he said.

A HELP feature prompts users outside of monitor commands; documentation provided with the \$2,700 operating system is said to include eight manuals written for different levels of users or managers.

'SAM' Simulates Latest IBM CPUs

LONDON — An updated version of SAM, the Systems Analysis Machine software originally developed by U.S.-based Applied Data Research, Inc., makes SAM the most sophisticated simulation system for large IBM and Univac CPUs, according to the vendor. Computer Program Products Ltd. (CPP UK).

SAM is made up of a library of mathematic models of various mainframes, peripherals and software systems and a language to help the user easily combine the component models in order to describe existing or proposed configurations, a spokesman said.

Once a configuration model is developed, simulated workloads can be applied to determine how

well it might handle the user's needs. Thus, plans for a data center can even be tested before any new hardware or software has been delivered, he added.

Hardware models in SAM Version 6 now include IBM's 3705 communications controller, the 3800 laser printer and both the 370/138 and 370/148 CPUs. The vendor also claims to have models for IBM's 3031, 3032 and 3033 processors.

OS/MVS and Vm

On the software side, the new release is said to include models of IBM's OS/MVS, for both multiprocessor and attached-processor configurations, and of Vm and the Network Control Program. In addition, there have

been "major enhancements" to the Information Management System model, the spokesman stated.

All support for users outside the UK is to be provided, from CPP's technical center in Amsterdam, "which was specifically set up to handle international requirements," he said.

Overall cost of SAM Version 6 is \$65,000 but users may acquire a basic system for \$35,000 plus the cost of individual models for the overall SAM library. CPP UK also offers a study service, based on the use of SAM, other measurement tools and the experience of CPP technicians, the spokesman noted from CAP House, 14-15 Great James St., London WC1, England.

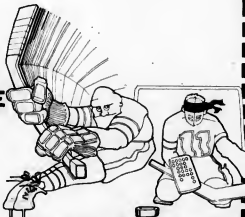
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Performance Handbook Ready

PHOENIX — The conceptual model of a performance management system described briefly in the *EDP Performance Review* ("Study Shows DP Management Flawed," *CW*, March 6) has been expanded into a two-volume *EDP Performance Management Handbook* published by Applied Computer Research (ACR).

Written by Barry Stevens and Phil Howard, the handbook was described as a guide to quantitative management of the DP function that showed how to review and audit the DP organization, how to build performance management into the department and how and when to use the tools and techniques of performance analysis.

The first of the handbook repeats the basic model, showing the interrelationships between the user and the planning, development and operations functions.

While Volume I includes suggestions for forms to use in the implementation of the system, Volume II contains detailed reference material on specific tools and techniques that can be used during various phases of the performance and enhancement process.

Loose-leaf in form for quarterly updates, each volume can be purchased for \$195; the set is available for \$350. All "bill me later" orders should include \$5 for handling. ACR can be reached through P.O. Box 9280, Phoenix, Ariz. 85068.

Packages on HIS Level 64 Outgrowths of Series 2000

WALTHAM, Mass. — Applications software for the revitalized Honeywell Information Systems, Inc. Level 64 hardware (*CW*, March 6) includes packages for the manufacturing and distribution industries in particular and a series of programs for basic business functions that span industry lines.

The general operations covered by the Financial Management Systems include payroll, accounts receivable, accounts payable and general ledger. Each of these application modules carries a monthly license fee of \$98, an HIS spokesman said.

For manufacturers, HIS introduced the Level 64 Production Scheduling

and Control (PSC) package to support capacity planning, job assignment, dispatching and control reporting. It is available under license for \$213/mo. The new Inventory Management System is also available to manufacturers to help them with planning, scheduling and controlling the flow of materials into, through and out of their facilities, the spokesman said. It includes modules for bill-of-material processing (including an inventory control subsystem), net-change material requirements planning (MRP) and standard costs.

The bill-of-materials processor costs \$110/mo, as does the MRP module; the standard cost module costs \$50/mo.

For the distribution industry, the on-line sales order processing system is said to handle the activities related to acceptance and shipment of orders, including inventory accounting and sales analysis. This package costs \$510/mo.

Reflecting HIS' intention to make Level 64 the replacement of the company's old 2000 series of CPUs, all the newly announced software has been adapted from programming available on the 2000s, the spokesman noted. The adaptations included substantial rewriting of code, however, to take advantage of the Level 64's native mode of operation.

'Extracto' Gets File Handling

MONTREAL — Optidata, a file handler option for the Extracto package, is now available from the vendor, Optipiro, Inc. An extension of the option supports accesses to various data base management systems.

Extracto is an interpretive, table-driven report generator system that eliminates the need for its users to understand or specify the logic of the programming.

Features of the upgraded Extracto are said to include an integrated data dictionary, acceptance of existing Cobol record definitions, a procedures cataloging capability, intermixing of I/O and Extracto statements, automatic file opening/closing and high-level I/O call and execute commands.

Optidata was designed for IBM 370 OS and QDOS environments. In its file-handling form, it costs \$5,000; the data base interfaces — for Cincom Systems, Inc.'s Total and IBM's IMS and DL/I — cost an additional \$2,500.

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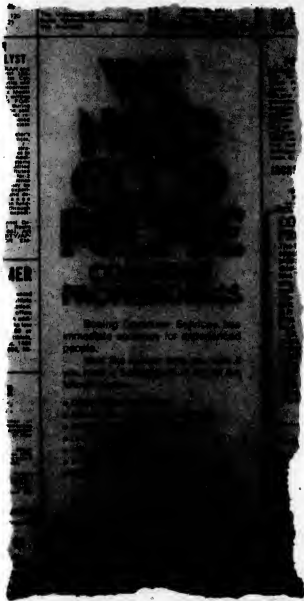
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'Ksam' Handles Micro Files

OAKLAND, Calif. — Users of microcomputers with floppy disk subsystems have the ability to work with keyed files under control of the Ksam80 utility now available from Efficient Management Systems Co. (EMS), a spokesman said recently.

Random storage and retrieval of records based on a key field is one of the facilities available to the Ksam user. The package also supports sequential access of records starting at any point within a file, random access by partial key, and random access by relative record number, he noted.

Space is allocated to a file when records

are added and reclaimed when they are deleted. Thus, Ksam files are self-reorganizing, the spokesman continued.

Any number of files can be processed simultaneously provided sufficient buffer storage is available. Ksam80's buffering techniques, incidentally, allow for a "significant reduction" in the number of physical disk accesses necessary to retrieve records, he said.

Ksam80 was originally developed under Zilog, Inc.'s Z80 OS 2.0 but can be implemented under many existing microcomputer operating systems, EMS said. It is available in object code for \$195, under a single CPU license.

Source code is available to OEMs, with rights to sublicense the software to their customers, for \$25,000, the company said. EMS can be reached through P.O. Box 24766, Oakland, Calif. 94623.

'PC/70' Goes Interactive

PHILADELPHIA — Project control comes closer to being the real-time operation it should be with the interactive data entry system (Ides) package now available for the PC/70 module from Atlantic Software, Inc., according to a spokesman.

PC/70 enables the manager to plan, monitor and account for the progress and cost of any project, but its batch orientation has been a limitation on its overall effectiveness, he said.

Atlantic stressed that the system doesn't limit the user to any particular predefined set of project elements — phases or tasks — or project numbering scheme. The system is adaptive to user needs, the spokesman asserted.

Ides supports entry of time reporting, project initialization and modifi-

cation from any terminal that functions under IBM's TSO environment. The interactive software will be available for use with CICS, the Conventional Monitor System and other teleprocessing monitors later, he said.

Ides provides editing and prompting in the event of an input error, the spokesman said.

Both Ides and the basic PC/70 are written in Cobol. In an IBM setting the system uses about 80K of memory. The Ides module is available to current PC/70 users for \$5,000, and PC/70 plus Ides can be licensed by new users for \$20,000.

Atlantic Software is at the Lafayette Building, 5th and Chestnut, Philadelphia, Pa. 19106.

Cincincom Updates Interdata DBMS

CINCINNATI — A multitasking version of the Total data base management system is now available for Interdata, Inc. 7/32 and 8/32 CPUs, Cincom Systems, Inc. has announced.

A single-task version of Total for the Interdata minis was announced last spring [CW, May 9] and that is still available for those who don't need the capabilities of the newer packaging, a spokesman said.

Total and its associated modules are dynamically loaded; and the multitask version of the DBMS comes with multiple extents for each file, a record level lock-out feature, buffer pool sharing and automatic handling of concurrent tasks. The multitask version is consistent with all other versions, the firm said.

Total runs under Interdata's OS/32 MT, requiring 128K bytes of memory, and allows data base access through calls from Cobol, Fortran or CAL routines.

The multitask system costs \$18,500 plus a \$1,200 installation charge, the Cincom spokesman said from 2300 Montana Ave., Cincinnati, Ohio 45211.

Freight Bills Figured By TCS 'Compu-Rate'

METUCHEN, N.J. — The Compu-Rate programs from Transportation Concepts and Services, Inc. (TCS) were designed to enable a shipper to install a bill-of-lading rating system on an IBM 370, a TCS spokesman noted recently.

The system enables the user to maintain comprehensive and accurate freight rates, calculate charges and audit/pay correct amounts, TCS said.

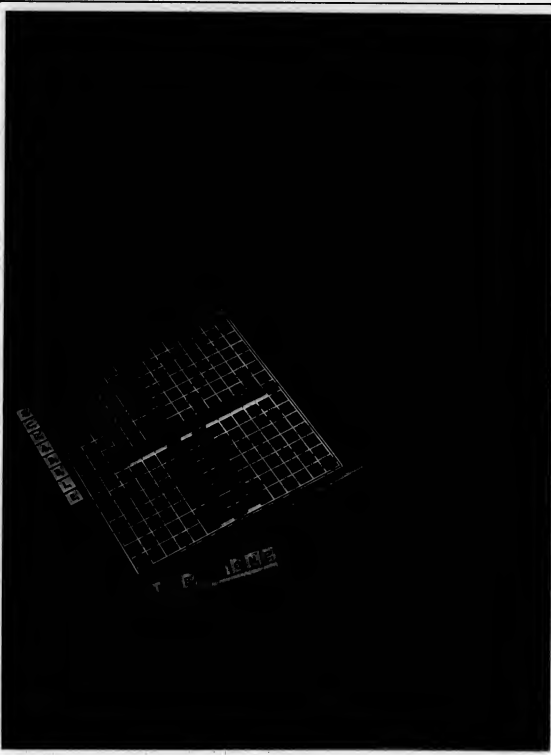
Modules within Compu-Rate are said to maintain all freight rates for all modes of transportation to produce and maintain printed rate schedules or "ponies" and to rate bills of lading, freight bills or freight transactions for invoices for parcel, motor or rail shipments.

Written in Cobol and requiring a 256K environment, the software ranges from \$20,000 for the "pony" producing module to \$70,000 for the full system. The vendor is at 20 Highland Ave., Metuchen, N.J. 08840.

Precompiler Eases

RPG Coding Chores

SILVER SPRING, Md. — A precompiler designed to simplify the writing of RPG-II Calculation Specifications for IBM System 32s and "mos" models of the IBM 3 is available for \$498 or \$99/year from Standard Software Co., P.O. Box 1434, Silver Spring, Md. 20902.



Contents of Data Bases and Files Controlled by Stand-Alone 'IDD'

WELLESLEY, Mass. — Introduced a year ago as an adjunct to the IDMS data base management system, the Integrated Data Dictionary (IDD) is now available from Cullinane Corp. as a stand-alone package for use in data base or conventional file-oriented environments; according to a spokesman.

IDD allows IBM 360 and 370 users to create a centralized resource of information concerning all corporate data assets. Specific IDD facilities include a data dictionary definition language (DDDL), source language preprocessors and a report generator.

The DDDL is a free-form, English-like language used to describe all data elements, records, files, programs, systems and users within an organization. The systems covered may even be manual ones with no connection to DP, the spokesman noted.

Interacting with the central dictionary file, the preprocessors can COPY data elements

and record definitions from the dictionary to build virtually all the data descriptions required for any applications program, he said.

The stand-alone IDD costs \$15,000. Users with IDMS installed can acquire the dictionary for \$12,500. Cullinane said from 20 William St., Wellesley Office Park, Wellesley, Mass. 02181.

Sea Structures Studied

KANSAS CITY, Mo. — Developed by Synercom the Marcs programs for the design and analysis of marine structures have been installed in the product library of the United Computing Systems, Inc. (UCS) remote computing network.

Marcs is made up of six integrated subsystems that simulate hostile marine environments so a user can evaluate either conventional or innovative structural designs.

The separate programs provide geometry generation and scaled drawings; stress and structural analysis; foundation analysis; generation of wind, wave, current and gravity loads; analysis of dynamic loads; and platform launch and flotation analysis, a spokesman explained.

The international UCS network is headquartered at 2525 Washington, Kansas City, Mo. 64108.

EMI Tracks Student Aid

DENVER — Financial aid officers at colleges and universities can ease their management chores and the handling of state and federal reporting and documentation requirements with a package developed by Systems Research, Inc. and now being marketed by Educational Methods, Inc. (EMI).

Modular in design and adapted to either batch or interactive operations, the software supports the tracking of student financial aid applications; evaluation of each applicant's need; packaging and notification of awards; and disbursement, accounting and management of funds, EMI said.

Written in ANS Cobol, the package can be installed on a variety of in-house CPUs — IBM and Harris now, with Burroughs Corp and Digital Equipment Corp. versions due this summer — or used on a service basis.

The package generally requires 200K of memory for on-line use on IBM equipment, although the "packaging" simulation run may use up to 300K for large universities, EMI said.

Either the Harris or the IBM version of the in-house system can be licensed for \$50,000 or "about \$800/mo," the spokesman said. EMI's service offering is at a fixed price per application, he added.

EMI is available through P.O. Box 2908, Denver, Colo. 80201.

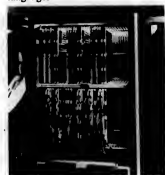
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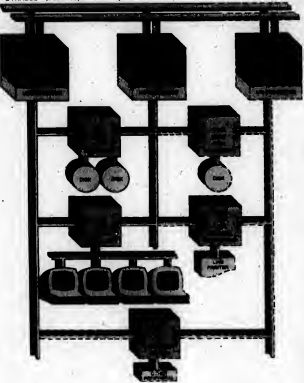
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Internal DP Controls Aid Divided Management

There is a tremendous need for better controls designed more economically and reliably. Systems design personnel may be trained in "systems analysis," but rarely are trained in the design of controls. Many controls they institute are not even recognized as controls. They are just the way things are done... sometimes.

Auditors, who are supposed to be the control experts, will list off numerous controls they think should be provided, but rarely provide any explanations as to how they reach their conclusions.

As a result, the systems designers repeat the same errors and omissions with the next system.

Three general areas of business operations generally provide concern: financial data, business assets and efficiency of operations. Accordingly, control and audit emphasis may be directed to any of these major concerns. The introduction of computers does not change these concerns, but it does change the things that may happen within these areas of concern.

First, the use of a computer usually

This article was excerpted from the book *Computer Control & Audit* by William C. Mair, Donald R. Wood and Keagle W. Davis of Touche Ross and Co. The book is available from Q.E.D. Information Sciences, Inc., 141 Linden St., Wellesley, Mass. 02128.

involves the storage of large amounts of information in one place. This information is in itself an asset. The record of a customer's account balance

may be one of the most important assets the organization has.

Second, the introduction of a computer has an impact on the basic organization of most businesses. Whereas the processing of a particular business function is usually centralized within one department under precomputer organizations, the introduction of a computer normally adds two more departments to this processing: a systems development and programming department and the information processing facility.

This may lead to a situation where the only executive having common authority over all phases of the application processing is as high as the president of the organization. This authority over all phases of processing may be termed "lowest level of common supervision." The phenomenon that we often observe with the introduction of a computer is an upward shift in this lowest level of common supervision.

Internal Auditor

This shift is the source of increased needs for effective internal audit. The internal auditor becomes the reconnaissance force for top management. Because no one below top management has authority over a complete process and because top management has limited time, the internal auditor is called upon to act as the eyes and ears of top management.

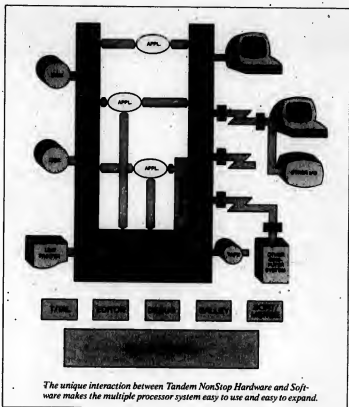
To effectively perform this role, the auditor must not only have the skills to evaluate the activities of the many functional departments, but also the technical skills needed to review the activities of the computer departments. Therefore, the manual auditor of old must grow and become the DP auditor of today — with all of the skills of before — plus!

We may define DP auditing as the verification of controls in three areas of the organization: applications, systems development and information processing facility.

With the managers of systems development, information processing facility and user departments involved and with top management, external auditors and internal auditors also concerned, who is responsible for the controls of a particular operation? This

(Continued on Page 50)

standard about our COBOL.



beginning of the program to set the NonStop mode. From then on, CHECKPOINT controls passing information to the backup process at critical points. CHECKPOINTS occur automatically at any OPEN or CLOSE after the backup is established. These two simple instructions eliminate the downtime, restart, and revalidation which plague any user without the Tandem NonStop capability. ANSI X3.23 '74 to Level 2 in Nucleus, Table Handling, Sequential I/O, Indexed I/O, and Sort-Merge right now. With Communications to Level 2 this Spring. Completely standard with CVSS and that means portability.

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Package Real Asset for This International User

By Charles Broyles

Special to CW
Hewlett-Packard's decision to evaluate fixed asset packages offered by software companies was basically a cost

consideration. Our objective was to find a package that would satisfy our asset accounting requirements at a cost significantly less than the cost of developing one our-

selves.

Prior to reviewing any system, we established several requirements the system must satisfy:

- The system's current design must support HP's asset accounting requirements.
- The system must support a multidivisional environment.
- It must be designed or easily modified to support an international operation.
- It must be well documented.
- Programs must be structured for ease of maintenance.
- It must be coded in Cobol.
- Customer recommendations must be very high.

After reviewing several asset accounting systems, the Data Design Associates package was the only one that met all of our selection criteria. An important factor in our decision to purchase the system was its ability to support two sets of books. Since a large part of our business is international, we felt this capability to handle two sets of books would be an ideal design to support two currencies: one book for U.S. depreciation and the second book to support the international or local depreciation requirements.

After we purchased the Data Design package, we assigned the implementation and support responsibility to our corporate accounting systems group. The first effort was to establish the system in several domestic divisions. Then after

sufficient experience with the system and further study of international requirements we would provide the system to our international divisions.

Our first effort was to review the system in detail and identify both system and documentation changes necessary to fully support HP needs and convert the system to our HP 3000 computer.

At the same time this was being accomplished we were generating test files, conversion programs and training class material. We selected a local division that typified our HP Operation for a pilot installation. In our pilot installation we were confronted with two problems:

- The pilot implementation was not made on a fiscal year boundary, but we wanted to take advantage of the annual reporting facility in the Data Design package. Therefore, we made an attempt to recreate all previous month's activity on the new system. We found this took more time than it was worth and the consolidation of old and new systems information at year end was far simpler.

- Our old asset accounting system calculated depreciation differently than the year-to-date depreciation calculation capability in the new system. As a result, we needed to either make an adjustment or

create a program that would load year-to-date depreciation information. We decided to make the adjustment as of the beginning of the fiscal year to make reconciliation easier.

Our pilot installation took two months, of which the majority of the time was spent trying to recreate previous month's activity. Since that time we have installed the system in 22 of our domestic divisions and our average installation time is now about four days.

The next major step was to analyze our international requirements and determine what specific changes needed to be made to support their needs. We found the design of the system allowed us to easily modify it and within 10 weeks we had made the necessary program changes, altered the documentation, trained employees and installed the system in two of our international divisions.

Currently we have had the system for over two years and have been highly impressed with both the system and vendor support. In fact, we have been so satisfied with the fixed asset package we have recently purchased the Data Design Associates accounts payable package also.

Broyles is manager of administrative accounting systems at Hewlett-Packard.

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Need for DP Controls Vital to Management

(Continued from Page 49)

question has frequently been debated, but it is usually resolved that the users must be primarily responsible. Their performance is being affected by the computerized system; they have the most immediate knowledge of a computerized application; and they have the most to lose.

However, where the user manager cannot reasonably be expected to have adequate technical comprehension to exercise total control responsibility, higher levels of management should provide necessary support to assure proper technical controls. This is often provided by a separate quality assurance function.

The objective of an audit of compliance with controls is to predict the reliability and related exposures which should be expected from the system in operation in the future. The auditor shouldn't be a "cop."

Enforcement of daily operating controls is a function of line management. Of course, where such enforcement is lacking and would improve the reliability of the system, the auditor must call for implementation and enforcement

of proper controls. But this is a secondary function.

The internal auditor's primary function is to evaluate controls, verify their implementation and provide his conclusions to management.

In meeting the objectives of a financial audit, the certified public accountant seeks evaluations of reliability of controls so he may limit the extent of substantive audit work required to render an opinion on financial statements.

Controls, causes and exposures are the elements for evaluating the reliability of a particular function. Exposure is the financial effect of a cause times the probable frequency of its occurrence. Causes are the activities or circumstances that adversely affect a business. Controls are anything that acts upon causes so as to tend to reduce exposures.

The same general exposures exist for every business. The introduction of computerized information processing does not change the nature of the exposures but rather changes the nature and frequency of the causes. Accordingly, different controls must be adopted.

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Series/1 Turnkey Package

Mini Saves User 65% of Cost of 3704

By Ronald A. Frank
CW Staff

WHARTON, N.J. — Is it possible to have the capabilities of an IBM 3704 front end at 35% of the cost? Yes, according to Gary Sullivan, president of ICC Computer, Inc., a time-sharing service here.

The system that reportedly provides ICC Computer with 3704 capabilities at only a fraction of the cost is a turnkey IBM Series/1 minicomputer with communications software from Series 1 Plus, Inc., also of Wharton.

The Series/1 front end operates at ICC Computer with an IBM 360/50 CPU and controls a network of 150 Hazeltine, Inc., CRT terminals. The Modular One terminals are operating at about 300, which access ICC for time-shared services.

The Hazeltine CRTs operate at 2,400 and

Three Smart CRTs From Zentec Boast 'Video Flexibility'

SANTA CLARA, Calif. — The Zentec Corp. has introduced a family of user-programmable CRT terminals, called the ZMS 50, ZMS 70, and ZMS 90.

In addition to sharing the same 8080 microprocessor bus architecture, the three terminals also share a list-driven structure that reportedly provides video flexibility. In such a structure, data that may be distributed in bits and pieces throughout the random-access memory (RAM) is displayed as contiguous data on the screen. Each line or segment is defined by an entry in a program control list, which directs the data to be screened. Therefore, data to be displayed does not have to be contiguous in memory, the firm said.

Zentec CRTs provide programmable synchronous or asynchronous communications interfacing without a hardware change. A programmed chip controls the output port under program control, a spokesman said.

A carry-over design feature from the company's earlier Model 9003 is the "25th line" for operator messages and system status information. The terminal can bypass the display screen using this feature, allowing communication directly with the host computer and display of messages from the host to the Zentec terminal, the firm said.

The ZMS family shares many of the same technical features, yet each relies on specific design applications that make them best suited for a particular use, Zentec noted.

The ZMS 50 is "a smart editing CRT," (Continued on Page 52)

4,800 bit/sec. with modems supplied by Penril Corp. The network uses the Binary Synchronous Communications protocol and the Series/1 emulates an IBM 3270 terminal that is directly connected to the CPU, Sullivan said. The front end uses IBM's Basic Telecommunications Access Method (BtAm).

The Series/1 does all network polling and message switching and only interrupts the host when it has some processing to be done on the mainframe.

ICC Computer provides a time-sharing service for businesses that includes such business applications as inventory control and accounts receivable.

Its previous system included a Memorex Corp. 1270 controller, but there were some in-house problems in programming this unit, Sullivan said. The user therefore decided to get the Series/1 on a turnkey basis.

One of the key reasons for this decision was the 360 interface that Series 1 Plus had developed, Sullivan said, explaining a Series/1 "in its native state" cannot be attached to a 360.

"You don't have to be U.S. Steel" to operate this type of network, Sullivan said. Right now most smaller communications users are running 3704s and many of them handle only local mode traffic. The Series/1 solution is lower cost and provides the flexi-

bility to expand, he said.

The Series/1 will be used as a remote processor in the network. In the next four months, the IBM mini will be installed in Boston, he said.

The front-end software added by Series 1 Plus has been "coded pretty much in line with IBM" and can run under RTTS, the real-time monitor. The Series/1 has 128K bytes of storage, and Sullivan estimated the network can expand up to about 300 terminals before additional capacity has to be added.

Implementation of the IBM front end began about five months ago; at the time, there was no firm other than Series 1 Plus that could provide the same features in the Series/1, Sullivan said.

The Modular One CRT includes an Intel 8080 microprocessor with a binary synchronous interface that is programmed to look like an IBM 2780 to the front end.

Although ICC Computer would not disclose the exact cost of its Series/1 front end, a spokesman at System 1 Plus, the supplier, said the turnkey offering ranges from \$35,000 to \$100,000 depending on the number of communications lines, the processor's memory size and the size of the disk storage. The ICC Computer system is priced at the upper end of this scale, he said.

Handling Two Jobs on One Net Gets Smart Multiplexer an 'A'

By Marguerite Zientara
CW Staff

NEWCASTLE, Del. — The Alexis I. DuPont School District is operating two separate applications on one network — the Computer Project for itself and Project Direct for the entire state of Delaware — by using Smart/Network Multiplexers from Digital Communications Associates, Inc.

According to Carl Hauger, the school district's computer services director, the Computer Project uses a Digital Equipment Corp. PDP-11/34 minicomputer running under the RSTS operating system and a Hewlett-Packard Co. 2000 to provide a computer science program offering four courses.

In addition, Computer Project provides aid to students in areas such as math, social sciences, science, business administration and home economics.

On the statewide level, Project Direct connects 48 schools and institutions to a Cincinnati-Milacron processor for computer-aided instruction, to a DEC PDP-11/50 running RSTS and to the A.I. DuPont computers. The goal of Project Direct is to pro-

vide concentrated remedial help for students having problems in reading, math and language arts," Hauger explained.

The Smart/Network System connects up to 87 remote users to any of the four geographically dispersed host computers. It uses Vadic Corp. modems and primarily Teletype Model 43 terminals, rented from the local telephone company.

Users throughout Delaware can connect to the nearest Smart/Mux multiplexer, from which they are routed to the desired host computer.

The terminals operate at 300 bit/sec, according to Hauger. Information from the terminals is concentrated into each of a series of four communication processors and then transmitted at either 2,400- or 4,800 bit/sec to whichever host the user has selected.

A.I. DuPont chose the Smart/Network for its ability to switch terminals easily throughout the network and for its "uncanny ability to be reconfigured during operation," Hauger said.

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On-Line Terminals Track and Control Inmates

CHICAGO—The Cook County, Illinois, Department of Corrections (DOC) has instituted one of the world's most comprehensive and extensive inmate tracking and control systems. Called the Correctional Institution Management Information Systems (Cimis), the terminal-based system is reportedly helping the jail staff provide a more just and responsive correctional institution, improve security, decrease prison tensions and generally make day-to-day operations more efficient.

The key to Cimis is an on-line, mid-sized Hewlett-Packard Co. 3000 computer configured with a front-end HP 21MX minicomputer. This arrangement is equipped with advanced proprietary transaction processing and

network management software supplied by Systems Research, Inc. of East Lansing, Mich., that permits up to 209 point-to-point terminals or 40 multiplex data lines to be interconnected throughout the large correctional facility.

In addition, the Systems Research transaction processing software system enables Cimis to handle up to 60 transactions per minute.

Large Population

"At Cook County, we have a daily population of 4,000 inmates," Sheriff Richard J. Elrod explained. "Each day about 400 of them go to court, and after a holiday weekend as many as 1,000 go before the judges. About 55,000 persons enter this department

annually.

"Because of its size and extent, it is vital that we run this transient community of ours in the most business-like fashion," he pointed out.

Cimis tracks each inmate as he is moved from the receiving areas to a certain tier, cell, chapel or court. This ability to find an inmate quickly is especially important when lawyers are seeking their clients for consultation.

The system also keeps track of court dates and clinic appointments. Additionally, through the use of CRT terminals it is building a data base for research purposes, and Cimis makes accurate and current records accessible to all within the institution who have a need to know, the sheriff said.

"The essential problem with the old

manual record system was that it never helped the line decision makers in their daily work," according to J. David Coldren, director of Cimis. "We were running the facility under 20th century pressures with 18th century techniques."

"Our goal was to have 64 terminals, and eventually as many as 120, but not one minicomputer vendor could support the number of on-line terminals we anticipated. Finally, we located Systems Research, which had already developed software that expanded the HP terminal capability tremendously," Coldren noted.

Systems Research is primarily

(Continued on Page 54)

Zentec Unveils Smart CRT Line

(Continued from Page 51)

which reportedly distinguishes itself from other terminals by its customization of read-only memory (ROM) chips. The ZMS 50 incorporates a "system specializing" chip set that is compatible with current ROM technologies.

The unit has expandable RAM memory, and the basic configuration calls for 4K bytes, used for refresh memory for up to two pages of video display. For larger display applications, extra RAM is available for execution and storage of user-supplied downline-loaded programs. The ZMS 50 can be configured with 16K bytes of RAM, extending the capability for downloading programs, the firm said, and it costs \$2,395.

The ZMS 70 software-oriented design is said to provide a high degree of flexibility with its self-contained mini diskettes. It uses a list-driven structure with up to 65K bytes of memory and can off-load and store data.

In addition, the ZMS 70 has a video circuitry for control and attribute definitions of characters on the screen.

The ZMS 70 has a programmable character generator. When the unit is powered up and the operating system is loaded, the standard 128-character set is displayed.

Zentec provides an optional utility program that allows the user to alter or define characters. Using the program, an operator can call up any character he wishes to change into a 10 by 8 matrix within a 10 by 10 cell. Characters can then be restructured and placed back in the character set. This flexibility is especially suited for foreign language application or data coding for security purposes.

The ZMS 70 software structure reportedly accommodates a variety of Zentec-supplied programs including an operating system, utility programs, software development tools and applications software. The unit costs \$6,495.

The ZMS 90 has a "building block" design that reportedly can be anything the customer wants, within the basic parameters of bus architecture and the card cage size. It accommodates customer user-design interfaces and boards, can be configured as a firmware or software terminal and costs \$3,795 from Zentec Corp. at 2400 Welsh Ave., Santa Clara, Calif. 95051.



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T-BAR's 3015/3016 matrix switches for use with ITEL, AMDAHL and IBM 360/370 type computers permit load balancing by sharing printers, tape drives, discs and front ends between CPUs. Greater configuration flexibility is attained by using the larger T-BAR matrix sizes—up to 12 computer channels and 12 strings of up to 4 peripherals each—12x12.

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PERKIN-ELMER

Data Systems

On-Line Terminals Enter Cook County Prison

(Continued from Page 52)
engaged in the development and sales of computer software systems especially oriented to on-line transaction processing. The company offers the MCS3000 (Message Control System) system which consists of a front-end communications processor complete with its own software, firmware, message routing software for the HP 3000 and all required interfaces.

MCS 3000 defines, manages and controls the terminal network, application processors and provides a modular structure for application programming, enabling application software to be written as if for a single user and terminal of unspecified type.

The Cimis project in the Cook County Jail was designed by seven programmers over a period of about four years. The actual coding of the

the DOC facility entailed about a year's work.

The current operations staff consist of Cimis manager Jim Bongiovanni, one systems analyst, one user trainer, four others for field support and a computer operator.

Cimis hardware includes the HP 3000 system with 512K bytes of internal memory; the HP 2888 50M-byte disk drive; and two HP 7905 15M-byte disks. The front-end proces-

sor is an HP 21MX with internal memory of 64K bytes.

The 41 HP 2640 terminals connect through dedicated telephone lines up to the HP 21MX processor. An HP 2644 terminal is used for program development.

Selection of HP in the Cimis project was based on several factors, according to Larry Meyers, director of marketing for minicomputer systems.

"The HP 3000 system in-

cludes a time-sharing operating system, a good Cobol compiler, the Image/Query data base management system, constraint code and good hardware reliability," Meyers commented. "MCS 3000 adds these features: ease of programming, high throughput and expanded data communications capability without requiring hardware vendors or modifying HP software."

Daily Use of System

The system keeps track of inmates from the receiving room to the cell. Each inmate coming through the receiving room is assigned a number, answers personal and medical history questions and has aliases, other identification numbers, charge and sentence information entered on the records.

When the inmate arrives at the tiering officer's area, a cell is assigned based on the information called up on the officer's CRT.

The inmate is brought to a cell and along the way there are checkpoints where the CRT terminals are used to enter the inmate's arrival and other pertinent information. This information automatically ripples through the data base, updating all pertinent files on the inmate.

The transaction processing system works in such a way that if a court date is changed for a certain inmate, for example, the CRT in the records office is used to enter the new information. A formatted screen is displayed (some fields are protected) and the operator makes the change.

Under the former method, records were kept on handwritten cards. It took eight staff members four days to arrive at a population analysis, according to Bongiovanni.

Today, the analysis is produced in 30 minutes by the processor.

The best gauges of the overall performance of the MCS 3000/HP 3000 combination are the 3- to 5 sec response time on the active terminals which simultaneously access the large image data base and the one to two man-week period required to write, test and place application software for a new transaction into production, according to Meyers.

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For Data Collection Project

Europe's Largest Brewer Installing Terminal Net

WEST BROMWICH, England—In the UK, Bass Charrington (BC) brews about 20% of all the beer produced annually. Each year its production expands as consumption continues to rise, despite increasingly heavier taxation on beer. BC resulted from a merger in 1971 between two major UK brewing groups — Charrington United Breweries, and Bass Mitchells and Butlers. The company's 70 brands of beer are distributed through some 50,000 retail outlets in the UK.

Keeping track of BC's widespread and growing operations is the Computer Services Department, headed by John Henderson, management systems controller. "We operate in much the same manner as a service bureau, supplying our expertise in DP whenever possible to expedite all phases of the company's business operations," Henderson explained.

When the merger occurred in 1971, one of the major tasks in knitting together the two large organizations was to unify computer equipment and systems.

Bass Mitchells & Butlers had an IBM 1440 computer while Charrington was in process of installing two Honeywell Information Systems, Inc. 200 systems for its batch applications. After the merger, the Bass part of the new group decided to switch all its work to a third HIS 200. Eventually a fourth HIS 200 system was acquired on a rental basis to cope with an increasing workload.

Merged Data Vats Grow

It was about this time that company executives began planning for the company's future growth. In the computer applications area, the direction was toward a real-time system that could handle order entry on-line.

"With such a system," Henderson noted, "the big benefit would be better and faster customer service in addition to a more efficient operation for the company. To accomplish this, we projected a number of minicomputers feeding information into a large central processor."

The company embarked on

an investigation of vendors using the services of the Logistics consultants group. In the end the choice lay between HIS and Univac.

"At this point," Henderson explained, "we used a weighted ranking system to evaluate the systems by the two vendors with special emphasis on hardware, software, communications capabilities and

other users' opinions."

The evaluation resulted in an order placed in March 1974, for two Univac 1110 computer systems.

The 1110 systems were installed in two new and separate computer centers. The first one was delivered in March 1975 to the center in West Bromwich near Birmingham and the other to the

second computer center in Glasgow, Scotland, in September of the same year. If one system should go down, the other can act as a backup.

The four BC subsidiary companies in Northern Ireland, Scotland, and the North of England are linked to the Glasgow 1110 system, while the other firms are tied to the West Bromwich 1110 systems.

Each 1110 system has an identical configuration with a main memory of 64,000 words, extended storage of 131,000 words, one high-speed FH-432 and one high-speed FH-1782 drum subsystem and five Univac 8440 disk storage subsystems providing a total mass storage capacity of 102.3 million words.

(Continued on Page 57)

DIGITAL, MARCH, 1978.

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VAX PRICE-PERFORMANCE MAY MAKE IT THE BEST FORTRAN NUMBER-CRUNCHER EVER BUILT.

Benchmark after benchmark is showing the new VAX-11/780 to be the hottest FORTRAN machine ever made.

Benchmarks for VAX double precision are at 711K Whetstone instructions per second. Single precision benchmarks are at over a million. Running all kinds of programs, including some in the tens of megabytes, VAX tested twice as fast as another prominent FORTRAN machine, and it costs about one-tenth! Another tester describes VAX

as one-twentieth the speed of a CDC-7600—but one-fiftieth the price!

VAX handles real-time applications in incredibly fast compute time. The VAX instruction set, the floating point performance, the same UNIBUS as the PDP-11, more bandwidth than anybody needs, fast priority scheduling, and its interrupt-response capabilities make it a real-time superstar.

Other features reported from the field: easy to use, easy to get up and working, good development tools.



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CHERRY HILL, N.J. — Management Information Corp. has published *Datacomm for the Businessman*, a concise volume about the data communications industry aimed at businesspeople.

The 60-page report covers the following topics:

- "An Overview of Data Communications."
- "The Modem is More Than Just a Translator."
- "Multiplexing and Concentrating: What Actually Happens?"
- "Packet Data Communications."
- "What Is a Wats Line and Who Can Benefit From It?"
- "Commercial Communications Satellites Facilities."

The book is priced at \$25 from Management Information Corp., 140 Barclay Center, Cherry Hill, N.J. 08034.

Brewer Gains Smart Network

(Continued from Page 56)

Also part of each system are eight Univac 12 magnetic tape units, a high-speed printer, a Univac 9300 subsystem and a Communications Symbolic Processor. A total of eight Uniscopie 100 CRT terminals are used at the two centers for program development.

Equipped for multiprogramming and multiprocessing, the 1110 system has the capability of performing more than three million calculations per sec-

ond. The usual trauma of program conversion was not a major problem. In fact, the HIS programs were converted to the 1110 systems ahead of schedule by a joint Univac and BC Team, Henderson said.

When the UTS 400 intelligent terminals become operational late this year in the subsidiary companies, they will take over the transmittal of order entry information from the present paper tape system.

Nevertheless, initial preparation of the order will be done locally as before.

A general-purpose, programmable, microprocessor-based remote CRT terminal the UTS 400 can be used for data entry, data processing control and monitoring, conversational interaction and off-line monitoring. A major advantage of the UTS 400 terminal is that it facilitates more economical use of data communications networks by cutting line costs through the connection of a large number of terminals on a single line, Henderson said.

Brewing Changes

The initial stage of the network implementation is the installation in each of the seven major BC subsidiary companies of a single UTS 400 cluster consisting of a controller, two or three terminals a magnetic tape cassette and a printer. Additional CRTs and disk storage units will be added as the companies become ready to take on their full input load.

"We would rather discover any 'teething' problems in a training exercise than wait until we are in an actual operating situation," Henderson noted. "In that way we can discover potential problems and correct them in good time before we go live."

One of the developments in the pipeline is a Special Retail Accounting Package which will incorporate all types of statistics on usage and performance as well as purchase ledger and nominal ledger programs. The package will first be applied to the Crest Hotels operation. Subsequently it will be applied to all the subsidiary companies.

Information on the business operations of the Crest Hotel chain will be transmitted over a Univac DCT-1000 terminal from Crest headquarters in Banbury to the 1110 system in West Bromwich.

One of the current tasks for the 1110 system is processing sales ledger and statistical information concerning the soft drink operations — involving some 25,000 accounts. Information on these operations is prepared on magnetic tape and delivered daily to the West Bromwich center by a security service for processing.

DIGITAL INTRODUCES THE LOWEST PRICED MAINFRAME IN THE WORLD.

DECSYSTEM-2020, a full, general purpose mainframe computer system, with concurrent interactive time-sharing, multi-stream batch, and transaction-oriented processing has been announced at a price of \$150,000 for its minimum configuration. The system is the low end member of the DECSYSTEM-20 family with identical operating system and languages. It is the lowest priced, most compact, and consumes the least power of any mainframe system in the world. It is also the only mainframe that can be plugged into an ordinary 110-volt outlet. DECSYSTEM-2020 features 36 bit word length, MOS memory in 64K

word units to a total of 512K words, 1.05 microsecond cycle time, single bit error correction, double bit error detection, low power Schottky TTLs, 512 word virtual address cache memory, microprocessor-driven console, microprogrammed central processor, 2K (96-bit) word writable RAM microstore, basic micro-instruction cycle time of 300 nanoseconds.

Also, 67 megabyte disk system minimum, expandable to 1.4 billion bytes, UNIBUS compatibility with peripherals, 8 asynchronous communication lines, expandable to 32. Mainframe housing 5 feet high by three feet wide.

HIGH END DECSYSTEM-2060 EXTENDS FAMILY LINE.

Digital has introduced a new mainframe at the high end of the DECSYSTEM-20 line. Called the DECSYSTEM-2060, the new mainframe has an advanced version of the KL central processing system used on the previous high end DECSYSTEM-20s, but offers twice the memory capacity of previous systems.

The DECSYSTEM-2060 has more terminal capacity, and more disk capacity than any previous system in the family. Its minimum configuration sells for \$600,000. Check the coupon for details.

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SUNNYVALE, Calif. — Buscom Systems, Inc. has announced a bill-paying telephone dial designed for use by customers of banks and thrift institutions.

Soft Touch is a tone dial that screws onto the mouthpiece of a regular rotary dial telephone, converting it into a pushbutton telephone. Upon dialing up the bank computer, the customer taps in his account number on the touch-sensitive device, then his code number, the merchant code number and amount of money he wishes to pay.

Soft Touch costs \$34.95 per unit, delivery from stock. It is available from 1230 Mountain View-Alviso Road, Sunnyvale, Calif. 94086.

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Modem Has Transmit Filter

SUNNYVALE, Calif. — An acoustic coupler/modem designed to enhance clarity and accuracy of telephone-line data transmission to and from terminals has been introduced by the Information Products Division of Omron Electronics, Inc.

Omron's Series 8300 data modem incorporates transmit filters, which are said to help prevent outgoing data from becoming lost or garbled in transmission. Transmit fil-

tering produces signals that are center-matched to Bell specifications, reportedly improving the performance of telephone interfaces at the receiving end of the communication link.

The modem's acoustic interface is designed to receive standard handset signals; Data Access Arrangement (DAA) interface, designed for Bell CDT or equivalents, allows the unit to be hard-wired for operation over the dial-up

telephone system. Plug interface, compatible with 25-pin EIA RS-232C connector, allows direct connection to private telephone lines, and 20 mA current-loop interface is included, the firm said.

The series 8300 modem is offered with switch-selectable originate-and-answer capability.

Single units are priced at \$275, with shipment in 30 days from 432 Toyama Drive, Sunnyvale, Calif. 94086.

Volker-Craig Unwraps CRT Line

WATERLOO, Ontario — Volker-Craig Ltd. has introduced a line of asynchronous data terminals for use in small business systems, computer time-sharing, with mini and micro-computers, and OEM/end user computer applications.

The VC404 standard terminal features a detachable Super/Lower case typewriter keyboard, 1,920-char. display on 12 in. anti-glare screen, data rates to 19,200 bit/sec, cursor addressing, RS-170 composite video output and a transparent/tape mode switch to allow the operator to display all 128 Ascii characters, the firm said.

A keyboard option package includes a 16-key numeric pad

and six operator function keys.

Other available options include a bidirectional serial peripheral interface connected from the CPU or keyboard, parallel input for bar code readers or peripherals, APL and other keyboard-character fonts (French, German and Swedish are standard), the firm added.

The VC414 Editor display terminal is microprocessor based and offers terminal features such as character-by-character, line or page mode transmission, line/character insert and delete, editing, horizontal tabs, format mode, pro-

duced data fields, multilevel video display and line drawing capability.

Optional terminal operating systems are available for VC414 compatibility with other manufacturers' models, Volker-Craig said.

Unit price is \$1,650.

The VC424 Terminator display terminal offers all the standard features of the VC404 and VC414 data terminals in addition to polling capability and independent printer port, the firm said.

Its unit price is \$1,850.

Volker-Craig is at 266 Mainland Drive, Waterloo, Ontario N2J 3Z9, Canada.

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Ann Arbor 400E

Gets Display

ANN ARBOR, Mich. — Ann Arbor Terminals, Inc. has added an upper/lower-case character display option to its Model 400E CRT terminal which uses Ann Arbor's Smart Monitor.

The terminal is RS-170-compatible and displays 20 lines of 80-character alphanumeric. Five additional lines remain hidden in memory and can be accessed in either roll or scroll modes, according to a spokesman.

Characters are written in a 7 by 10 dot matrix in a 10 by 12 dot field. Blinking characters for accent purposes are standard; the cursor is displayed as a blinking field, he noted.

The Model 400E utilizes a low number of components so that display and monitor electronics, plus power supply, have been mounted directly on the monitor chassis. A 15-in. nonglare screen is included in the unit.

The terminal includes a 72-key detachable keyboard which is standard with a separate numeric pad and individual cursor control keys.

All command and control functions reportedly can be executed from the keyboard. Single-quantity prices begin at \$1,310 from 6107 Jackson Road, Ann Arbor, Mich. 48103.

Save \$500,000/Year

One System Enough, Counties Discover

By Tim Scannell
CW Staff

GREELEY, Colo. — Proverbially, two may be better than one, but realistically, as demonstrated by two counties here, one system can be more than enough.

Weld and Boulder counties, located in northern Colorado, save \$500,000 annually by using the same IBM 370/138 to handle their administrative duties. A little more than two years old, the system serves up to 15 departments in each county on an on-line basis, according to Leon Dlug, director of computer services for the two counties.

"Rather than each county having its own computer department, we have one department, one director and one staff," Dlug said.

County clerks and recorders use the system to register motor vehicles, voters and property deeds and titles, while assessors can store and retrieve information about legal descriptions of property, both real and personal.

Treasurers use it to levy, extend and collect taxes that support local units of government, Dlug explained, and the system processes social services checks for both counties.

Operating expenses and maintenance fees for the system are apportioned between the counties according to population and tax rolls, Dlug stated. Boulder pays 37% of the costs while

Weld county is responsible for 43%.

"Those figures have been close to the actual proportion of usage between the two counties," Dlug observed.

The center is actually run like a private or

Some firms may have more in common than they think when it comes to DP. See story on Page 63.

non-profit organization and "until we come up with some good job accounting, the budget is set along these percentage lines, he said.

Previously, most of the DP workload was handled by a combination bank/service bureau that processed the material in a batch mode. Residents of both counties "... were used to having their records somewhere off on a disk

or on a tape... but felt more secure with the adoption of their own center because of the central location, security" and the benefit of having "... more [memory] bank for the buck," Dlug explained.

The 370/138 has 500K bytes of core memory. Peripherals include three IBM tape drives, a 3344 and a 3340 disk drive with storage capacities of 560M bytes and 140M bytes, respectively, a 2501 card reader and a high-speed printer. Both counties are on-line via CRT terminals "so whether [a county] is a mile away or 10 miles away, it doesn't make too much of a difference," Dlug stated.

Policies and procedures for the DP center are established by a nine-member advisory council of elected and appointed officials from both counties and the leadership alternates each

(Continued on Page 62)

Add-Ons Help Insurer Boost Throughput Value \$150,000/Mo

VANCOUVER, B.C. — The Insurance Corp. of British Columbia (ICBC), a government-operated automobile and general insurance firm, has reported an increased

throughput of about \$150,000/mo in internal user billings as a result of installing add-on memory for its two large-scale CPUs.

The reason stemmed from ICBC's birth only four years ago, when the government of the Canadian province of British Columbia set up ICBC. Its mandate was to operate and administer a comprehensive plan of universal automobile insurance for the province.

Rapid Delivery Needed

ICBC had less than a year to provide complete insurance to every licensed driver in this vast province, set up 20 claim centers, hire and train 2,200 staff members and generally administer all the functions necessary to operate a huge organization effectively.

Today, ICBC is a profitable organization, providing Autoplan, a complete auto insurance program at low rates, to the motorists of the province. Also, the corporation provides a variety of nonlife insurance through ICBC's General Insurance Division, which is now the largest general insurer in British Columbia.

Part of the reason for the corporation's move into the black this year for the first time has reportedly been the improvement of the cost-performance of its large com-

(Continued on Page 62)

Two CDC Subsystems Added

MINNEAPOLIS — Two disk subsystems capable of providing up to 38.4 billion bits of data storage for users of Control Data Corp. Cyber 176, 76 and 7600 systems were unveiled here by that firm.

The subsystems incorporate the CDC models 819-11 and 819-21 disk storage units and the models 7639-21 and 7639-22 single- or dual-access controllers, the firm said.

The 819-21 unit is a fixed media storage device that records data on 22 magnetic disks, a spokesman said. The unit has a storage capacity of 1.8 billion bits with data stored at the rate of 6,000 bit/in. on each of the 40 disk surfaces; the firm noted. The 819-21 also has a surface density of 384 track/in.

The Model 819-11 is similar to the 819-21 except that it has 50% of the storage capacity, or 2.4 billion bits, the spokesman stated. The 7639-21 and 7639-22 controllers allow an intermix of disk storage units in the subsystem and will recognize the unit type and

address accordingly, the firm noted. The 7639-21 will interface one to four storage units and permits multiple-overlapped seek operations concurrently with one read or write operation, while the 7639-22 controller will interface a maximum of eight drives and provides two simultaneous data transfers (read and/or write) to any two drives while retaining the multiple-seek feature, the firm said.

Both subsystems transfer data between the drive units and the host computer at a rate of 37.2 million bit/sec, it added.

Prices for the 819-11 disk storage unit are \$33,550 for purchase or \$1,650/mo on a three-year lease. The Model 819-21 can be purchased for \$75,000 or leased for three years at \$1,965/mo, the firm said.

Single- and dual-access controllers are priced at \$103,000 and \$107,000, with three-year leases costing \$2,700 and \$4,437, the firm said from Box 0, Minneapolis, Minn. 55440.



**"Noise reduction is just too important
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Dick McMullin, Lead Engineer, System Implementation, Noise
Airplane Company, Seattle, Washington



important at Boeing test results."

Boeing Noise Technology Lab, Boeing Co.

At Boeing, noise reduction research is a top priority, demanding fast turn-around of complex data analyses.

Prime computers are tied into over a dozen research facilities serving Boeing's 300-man noise technology staff, and mobile computers travel to remote sites for aircraft fly-bys and jet engine ground tests.

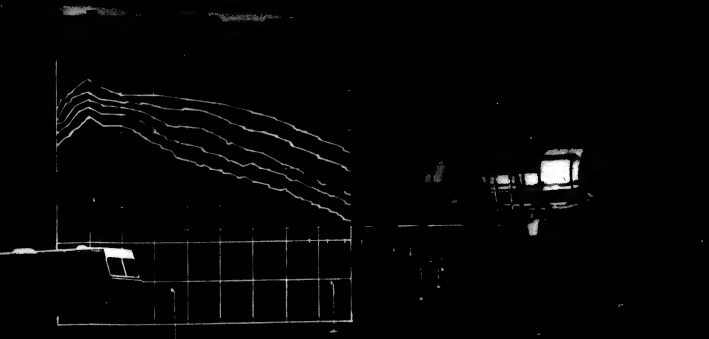
The on-line Prime computers can provide a "quick look" while the test is still running, and a complete acoustic analysis in hours - versus up to six weeks for Batch processing. The payoff has been more efficient noise reduction research for Boeing, and quieter skies for everyone else.

Prime's family of interactive computer systems offers industry standard software including FORTRAN IV, BASIC, RPG II, COBOL, and a CODASYL-compliant Database Management System. They also have greater memory capacity than any other family of small computers: up to 8 million bytes of high-speed main memory, 2.4 billion bytes of disk storage, and 32 million bytes-per-user of virtual memory.

Prime computers are also true multi-user systems: one computer can handle up to 64 simultaneous users in such diverse activities as RJE communications, forms processing, on-line data entry, computational time-sharing, and database management. And the PRIMOS Operating System allows any user to use any language at any time.

For the detailed story of how Prime is helping Boeing, and for more on how we might help you, contact David R. Johnson, Marketing Manager, Prime Computer, 40 Walnut Street, Wellesley Hills, MA 02151.

PRIME Computer
"Prime is helping"



Add-Ons Boost Canadian Insurer's Throughput

(Continued from Page 59)

puter facility.

"Not only was the number of insurance customers increasing, but the computer applications have grown too as we wrote the application software for such things as payroll, personnel records and the management information systems," Alan Garland, director of computer services, explained.

According to Garland, CPU memory became the bottleneck on the system. The paging rate was approaching the tolerable limit because the number of jobs to be performed had doubled. To keep pace in the most cost-effective manner, ICB's IBM 370/158 and the 370/168 CPUs, both operating under MVS, have had Memorex Corp. add-on memory attached.

As a result, the 370/168 now has 6M bytes (2M bytes of Memorex), while the 370/158 has 4M bytes (with 2.5M bytes of Memorex memory).

Moreover, the increased throughput made possible by the add-on memories has been converted to dollars. About \$150,000 each month in internal user billings is directly attributable to the add-ons.

The 370/158 normally operates the teleprocessing system. A shared-spool feature of the CPU's software package allows the operator to assign jobs between the two CPUs so that the 370/158 can be instructed to hand off a given job to the 370/168. User software packages available on the 370/158 include APL, IMS, CICS and RJE, which has six batch terminals.

Two Memorex 1270 terminal control units are being used to control the communications network. Each of them is switchable between the two CPUs. There are 46 lines coming into the 1270s — 44 of which usually are used to handle communications with the 370/158 at speeds of 130 bit/sec (four lines); 200 bit/sec (five lines); 9,600 bit/sec (one line); 19.2 kbit/sec

(one line), and the rest operate at 4,800 bit/sec. All communication is in Ebcidic transmission code. The other two lines operate with the 370/168 system at speeds of 4,800 bit/sec.

Continual User Growth

The growth in the number of terminal users has been continual. ICBC said. Less than one year ago, for example, there were an average of eight time-sharing users at any one time. Today, the average is 18. There are 120 time-sharing users who interface with the system over leased lines or via directly attached terminals.

The terminals in use at ICBC include 42 Memorex 1377 display stations, which are used by programmers to develop and test new programs. The

CRTs are also used to text-edit documentation such as various insurance manuals and the motor vehicle regulations, and they are used for on-line inquiry into auto insurance claims files, drivers' files and vehicle registration files.

ICBC is also using eight Memorex 3675 double-density disk drives, with a capacity of 1.6 billion bytes. And 16 of Memorex's 3650 direct access storage subsystems have been ordered to replace the equivalent IBM 3350s for use with ICB's Integrated Storage Control (ISC) central processors.

The disks contain several huge files, including 1.5 million vehicle insurance files and a multitude of other corporate records. All disks are addressable by both CPUs.

Counties Find One Is Enough

(Continued from Page 59)

year, Dlug said. Weekly and monthly meetings are held to discuss problems or upcoming projects concerning either Weld or Boulder county.

Budgeting is done on a project-by-project basis. When users submit a proposal, the DP department looks at it,



A clerk in the Weld County's treasurer's office finds lost property tax bill for resident of nearby Greeley County.

puts a dollar amount on it, decides what the equipment will cost and how much manpower will be needed. The council then compares this project with others and selects the one that will result in the greatest return both financially and administratively. The council provides this "overall guidance" so that DP doesn't get "caught in the middle" by servicing one county more than another, Dlug explained.

Long-range plans for the system include servicing the elections department, the department of motor vehicles, the district attorney's office, the sheriff's office and the communications center, Dlug said.

Are you a user?

Sophisticated?
Becoming experienced?
First time?
Or still thinking it over?

Whatever your level, one thing is certain: You'll be more of a computer user in the near future. And Computer Expo '78's Conference* has vital information you can't afford to miss. At least one of these days should be a must on your calendar.

TUESDAY

You're on the executive level. You deal with data processing personnel, problems, payments and plans. Today is yours.

The Executive Briefing

• Keynote speech "Strategic Systems Planning: A View from the Top," by an official of the consulting firm, Booz, Allen & Hamilton • Case Studies: Data Base and the Executive

• Presentations: Trends and Opportunities in System Financing, The Computer Resource of the Future

WEDNESDAY

Double Conference Day

(Two simultaneous conferences)

You're bringing in a first computer system for a small company, you're involved in light, in-house use of computers (maybe about to trade up), or just thinking of your own system. You'll want to attend the Program on Small Business Systems.

You're interlocking with computer personnel on a day to day basis. The Program on Managing People Problems is designed just for you.

Here's your schedule:

Small Business Systems

• Keynote Speech "Data Processing in Small Business. Today," by an official of Arthur Andersen and Company • Case Studies: Computer Uses in Financial Reports

• Presentations: Planning & Reporting • Presentations: How to Negotiate with Vendors • Days end

panels that include your questions, views and comments.

Managing People Problems

• Keynote Speech: Given by a recognized expert in data processing personnel management • Case Studies

• Career Pathing for Operators and Programmers, Improving the User/DP Relationship • Presentations

• Testing for DP Competence, Coping with Security/Privacy Regulations

THURSDAY

You're a manager or technician, and your organization is thinking of distributing its computer resources to regional offices and plants. This is your can't miss day.

Distributed Data Processing

• Keynote Speech "Critical Issues in DDP" • Case Studies: Applications for DDP: Equipment Selection

• Presentations: Networking Aspects of DDP, The Data Base Question



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San Francisco
Northwestern Computer Expo

March 28, 29, 30
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Houston
Southwestern Computer Expo

April 11, 12, 13
Astros Hall

Atlanta
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April 18, 19, 20
World Congress Center

St. Louis
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April 25, 26, 27
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May 2, 3, 4
McCormick Place

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Mid Atlantic Computer Expo

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For Daily Transactions

Restaurant Chain, Bank Share On-Line Service

By Tim Scannell

CW Staff

LAFAYETTE, La. — A national restaurant/fast-food corporation and a bank might, at first, seem to have little in common. One measures profits in the sale of hamburgers and french fries while the other concerns itself with checking accounts, municipal bonds and loan portfolios.

However, Chart House, Inc. and the First National Bank of Lafayette share the same large-scale computer system in managing their daily transactions.

MSD, Inc., a wholly owned subsidiary of Chart House, provides DP services to both companies via a Honeywell Information Systems, Inc. Level

66/20, a spokesman said. The diversity in each company's style of business keeps the computer running at a high capacity, 24 hours a day, he added.

Chart House, owner of steak and seafood restaurants under the Chart House, Bodega and Cork 'N Cleaver names, is also the largest independent franchisee-holder of Burger King hamburger outlets, the spokesman said. Point-of-sale terminals at the more than 300 hamburger outlets and 60 steak division restaurants are linked to six geographically dispersed regional centers by a network of HIS System 700 remote job entry (RJE) and communication processors. The System

700 RJE's handle regional DP chores and provide on-line communications to the host Level 66/20 system in Lafayette, according to the spokesman.

The Chart House information system keeps a running record of the return on investment for each unit, updates the company five-year plan by profit center and projects the profitability of new outlets, he added.

MSD also provides on-line account balance and daily financial reporting capabilities to the seven branches and head office of the First National Bank of Lafayette, a spokesman said. All accounts have to be closed by 6 p.m. every day so the bank can file its cash letter or transaction amount with the

Federal Reserve Bank in New Orleans before midnight of that day. If the letter and supporting out-of-state checks fail to leave with the 6 p.m. courier, the bank loses credit for the funds they represent until processed and delivered the next day, the spokesman pointed out.

On-Line Inquiry

Software packages developed by HIS, MSD and other banking-industry suppliers facilitate on-line inquiry for loan information, checking-account balances and other demand-centered customer information, in addition to typical banking routines, an MSD official noted.

MSD originally started as an independent service bureau but was purchased by Chart House and is now "oriented toward its DP needs with state-of-the-art processing requirements," according to Joe Fain, an MSD official.

"We're currently looking at methods of distributed DP (DDP) which will replace our systems in the field and allow our separate divisions and companies to do local batch processing and transmit general ledger-type data to us on a monthly basis," Fain stated.

Companies Offer Free Brochures

The following firms are offering free literature:

A brochure detailing ECRM, Inc.'s automatic character recognition (OCR) equipment is available from that firm at 205 Burlington Road, Bedford, Mass. 01730.

Datascop is offering a pamphlet describing how computer output microfilm (COM) can aid insurance companies. The firm is at P.O. Box 3460, Portland, Ore. 97280.

A pocket-sized compatibility guide for digital cassettes, disk packs, disk cartridges, diskettes and magnetic cards is available from the Wabash Tape Corp., 2700 Des Plaines Ave., Des Plaines, Ill. 60018.

A six-page booklet describing Columbia Ribbon & Carbon Manufacturing Co., Inc.'s line of DP supplies, including an illustrated guide to 31 mini-computer ribbons, has been released by the firm at Glen Cove, N.Y. 11542.

A 100-page illustrated catalog containing more than 2,500 supplies used in the DP field is being offered by the Visible Computer Supply Corp., 9855 Derby Lane, Westchester, Ill. 60153.

Intronics, Inc. has released a two-page bulletin describing its series (Continued on Page 64)

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| 40 Public Utility/Communications/Systems/Transportation | 14 Director Manager of Operations |
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| 80 Education/Service/Other | 18 Program Manager/Systems Analyst |
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| | 23 Computer |
| | 24 General Management |
| | 25 Other/Not Listed or Unrelated |
| | 26 Other |

Company Size

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Micrographics Group Sets Five-Year Objectives

By Frank Vaughan
CW Staff

WASHINGTON — The National Micrographics Association (NMA) will be stepping out to promote greater visibility and use of micrographics as an information-handling technology. NMA is also setting "realistic" growth objectives and "forward-looking" programs for the future, according to a spokesman.

The association is basing its future on a long-range plan that was adopted "in principle" by the NMA's board of directors. The plan sets the course for NMA activities through 1983.

The impetus behind the creation of the long-range report was the feeling that NMA has a "unique potential for greatly expanding the micrographic

industry and for increasing services to micrographic users and specialists," the spokesman added, noting that the NMA Board felt that it will take more aggressive, effective action to take full advantage of the association's potential.

In explaining its rationale for seeking an expanded role for micrographics, the task force that developed the long-range plan noted that micrographics is but one of several information-handling technologies. Paper is reaching its limits of effectiveness while electronics, computer and telecommunication applications are booming.

"Micrographics has not kept pace with these changes. Part of the reason is an outdated, negative impression of micrographics held by many nonusers.

Part of the reason also lies in the absence of aggressive, effective action by NMA to sell micrographics to nonusers. Both can be changed for the better," the task force charged.

Broad Mission Statement

In recognition of this requirement, the task force recommended a broadened mission statement for the association, which was accepted by the group at its 1977 business meeting. The revised statement reads: "The purpose of the National Micrographics Association is to serve its professional and trade members in fostering applications of micrographics, including interfaces with other information-processing technologies which facilitate the effective storage,

transfer and use of information."

With its mission statements, NMA has staked its claim to a larger portion of the information-processing field, the report said.

The task force also recommended 10 general objectives in keeping with the revised mission statement. They include:

- To promote expanded and innovative applications of micrographics.
- To foster the interface of micrographics with other image-processing technologies.
- To provide a forum for the analysis and communication of issues, trends, opportunities and accomplishments in micrographics.
- To interpret and report on changing social, governmental, economic and technological conditions affecting micrographics.
- To represent the interests of the micrographic field in government activities.

Professional Advance

- To advance the educational and professional qualifications of persons working in micrographics.
- To foster good business ethics and social responsibility throughout the micrographics field.
- To develop and promote standards required for effective usage of micrographics, including interfaces with other technologies.
- To develop and maintain comprehensive data on the field of micrographics.
- To stimulate coordinated activities with other organizations in pursuit of NMA's mission.

"Program planning, the task force feels, also has to be based on a realistic annual business plan. This plan should rest upon research that can produce an accurate revenue forecast and provide data on the cost effectiveness of alternative programs in meeting the association's objectives," the report said.

Users Offered Free Brochures

(Continued from Page 63)

DCW power converters and related specifications. The firm is located at 57 Chapel St., Newton, Mass. 02158.

A 24-page catalog detailing the firm's line of crash-imprinted "custom-look" business and office forms is available from Printcraft Systems, Inc., 11-17 Beach St., New York, N.Y. 10013.

Datel Details

An 8-page brochure presenting performance data on Datel Systems, Inc. HDAS-16 and HDAS-8 data acquisition systems is being offered by that firm at 1020 Turnpike St., Canton, Mass. 02021.

A 16-page catalog describing books, magazines, games and other items of interest to the computer professional and novice has been released by Creative Computing, P.O. Box 789-E, Morristown, N.J. 07960.

The Morley Co. is offering New England area users literature detailing its line of DP, word processing and dry copier supplies. The firm is located at 909 Islington St., Portsmouth, N.H. 03801.



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DDP Collars Shirt Maker's Inventory Woes

Special to CW
LOUISVILLE, Ky. — Not far from the site of the Kentucky Derby, a shirtmaker is racing to bring its inventory under control.

Turning out some 6,000 styles of dress and sports shirts each season, in every conceivable color, pattern, fabric and size, keeps Enro Shirt Co. busy.

The firm sells those styles in more than 4,000 department stores and men's specialty shops around the country. Accurate order writing is therefore an essential part of Enro's business.

Moreover, the company

produces knits, pajamas and robes, and the products some \$40 million dollars in sales annually — are manufactured, stored and shipped from four separate plants in Kentucky and the Carolinas.

Controlling inventory with that volume of transactions in a growing business is a challenge. To meet it, Enro recently took steps to create inventory control procedures by placing an order with Cybernetics and Systems, Inc. (CSI), the Louisville-based distributor of XL40 distributed processing systems.

Enro expects, after suitable testing, to place more XL40s,

manufactured by Perlec Computer Corp., in a distributed data processing (DDP) network tying the Louisville headquarters together with the company's warehouses, according to William A. Wacker, DDP director.

At each warehouse, Enro's order takers will enter sales orders, update inventory, generate shipping documents and make on-line inquiries on the XL40 files. These local files, a subset of the master customer and inventory file maintained at Enro's headquarters, will be transmitted after each day's transactions to the central XL40 here in Louisville.

Following the telecommunications from the warehouses' XL40 disk files, the central XL40 will produce a magnetic tape for entry into the headquarter's Honeywell computer, where invoices will be created and master files updated. Next morning, the central XL40 will transmit updated master file subsets to the XL40s at the various remote warehouses.

Using the DDP system, telephone orders may be entered directly on XL40 CRT terminal keyboards by Enro order takers as the order is discussed with the customer.

The XL40's on-line file inquiry capability will allow order takers to immediately determine quantities on hand by size, pattern, fabric or style, a decided advantage in on-the-spot adjusting of an order mix to avoid unnecessary back orders, he noted.

No More Manual Updates

Enro's previous procedure was to send a weekly inventory report printout to the remote warehouses. Order takers were then responsible

for manually updating the warehouse inventory status, a situation made difficult because they were generating corrected quantities on several different copies of the same report.

As the inventory status grew progressively inaccurate, orders were frequently placed for stock that was already allocated to earlier orders, resulting in incorrect back orders and incomplete shipments.

Now order takers entering data concurrently at the remote warehouse locations will know they have up-to-the-minute inventory status because their sales order entries will adjust the warehouse XL40 inventory files immediately, Wacker pointed out.

Complete Control

Each warehouse will have complete on-line control of its inventory status; new stock can be added, stock returned from customers can be checked in and physical changes, such as changes in bin location, can be recorded.

When new stock is added, the XL40 will generate a new record. When a style is discontinued, it is deleted from the file so it cannot be ordered.

The data retrieval application software used by Enro allows the operator an inquiry index key of 19 characters. In addition to style name and number, the department, season, cloth pattern and sleeve length can be used as search keys, the resulting display showing the operator available quantities in collar sizes from 13-1/2 to 20 in increments of one-half.

The system accepts garment industry-standard terminology

of whole number dozens and fractions of a dozen by maintaining two-column data entries, Wacker noted.

Already Beginning

Through these inventory control procedures, Enro will have distributed its data base to its warehouses for local data entry and local file management and inquiry at the source. At its headquarters in Louisville, the DP department has already distributed a data processing function — accounts payable — to a source department.

Using the Perlec-built XL40 System, Enro's accounting department personnel operate payables independently of the central DP system, still maintaining proper control. They transfer files in a batch mode each week to the central computer for recordkeeping and management information purposes.

"We're stepping from a second-generation batch system to a modern on-line operation conveniently at very little cost," Wacker said.

CSI, which developed the accounts payable software package for the XL40, views Enro's move toward DDP functions as a practical way to get more effective local results while still protecting the integrity of central system data files.

"It's all part of staying in competition," Wacker added. "We've got to be as modern in DP as we are in shirts."

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Gould Has Printer/Plotter For C and D Drawings

CLEVELAND — Gould, Inc. has introduced an electrostatic printer/plotter that is reportedly capable of producing C- and D-size drawings with a resolution of 5 mil (.005 in.) at paper speeds of up to .72 in./sec.

The Gould 5300 printer/plotter uses 22-in.-wide paper and features a closed-loop toning system that produces dry hard copy 5.5 in. from the toning head, overlaps dot printing for high-contrast images and utilizes a time-phased imaging technique, a spokesman said.

DMA Links

On-line direct memory access (DMA) interfaces are available for Digital Equipment Corp. PDP-11, Hewlett-Packard Co. 2100, Data Gen-

eral Corp. Eclipse and Nova and IBM 360/370 systems, the firm stated. The unit also operates off-line with the IBM 360/370, Univac 1100 series and Control Data Corp. 6000, 9000 and Cyber series of computers.

The unit was designed for such applications as computer-aided design, seismic data plotting and business graphics projects such as PERT/CPM, Gantt, pie, bar and line charts and CRT hard copy.

Prices for a typical mini-computer-based system containing a DG Nova or DEC PDP-11 computer range from \$23,000 to \$24,000. IBM 360/370-based systems, on-line or off-line, are priced between \$34,500 and \$40,000, the spokesman said from Gould, Inc., 3631 Perkins Ave., Cleveland, Ohio 44114.

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Mini/Micro Conference Scheduled Next Month

PHILADELPHIA — The Mini/Micro Computer Conference and Exposition will be held at the Civic Center here April 18-20.

According to session organizers, the conference will cover such topics as "Microcomputer Software Development: Choosing Among the Different Methods," "Small Business Systems," "Minicomputer Application Languages," "Criteria Used in Selecting and Evaluating a Minicomputer" and "Alternative Minicomputer System Architectures."

An exhibit featuring about 100 product and system manufacturers will be held concurrently with the sessions. In addition, the Institute of Electrical and Electronics Engineers (IEEE) will offer a one-day course on "Minicomputer and Microcomputer Applications" on Monday, April 17.

On Wednesday, April 19, the International Society for Mini and Microcomputers will present a course entitled "Step-by-Step Design of Microprocessor Systems."

Registration in advance costs \$25 per day or \$60 for all three days for the conference and exposition. Those registering at the door will pay \$30 for one day and \$60 for all three days. The exposition itself costs \$5. Additional information is available from Mini/Micro Conference and Exposition, Suite 1, 5528 E. La Palma Ave., Anaheim, Calif. 92807.

HP 3000 Machines Get \$11,000 Markdown

PALO ALTO, Calif. — The prices of the Hewlett-Packard Co. 3000 minicomputers were slashed by \$11,000 last week.

The HP 3000 Series I now costs \$64,000, down from \$75,000, for a system that has 128K bytes of memory and 50M bytes of disk.

The HP-3000 Series II Model 6 now costs \$99,000 for the basic configuration, down from \$110,000. The Model 8 now costs \$129,000 compared with \$140,000 previously.

HP said a typical 3000-II with 320K bytes of memory, two 50M-byte disks, a 1,600 bit/in. magnetic tape unit, CRT console, 300 line/min printer, 16-port controller, 9,600 bit/sec synchronous communications controller and software including Cobol, Basic and multilevel remote job entry costs \$153,560. It formerly carried a \$164,560 price tag.

HP is located at 1501 Park Mill Road, Palo Alto, Calif. 94304.

Office Environment Poses Problem With Dirty Disks

By Esther Surden
CW Staff

You are a small systems user and your system is set up as part of the office's regular decor. The people in your office are normal—they sometimes spill coffee and soda, drop cigarette ashes and keep the windows open.

Do you have a problem? You might, if all these conditions lead to dirty disks—and therefore to lost information and lost money.

An office environment is "an order of magnitude or two dirtier" than a computer room and the disks used in it require cleaning, according to John Read, principal engineer for Digital Equipment Corp. in Colorado Springs, Colo.

Several vendors are now offering portable disk cleaners for small systems users. These cleaners can be helpful not only to those users in normal office environments, but also to those with facilities that are normally a bit dirtier because they are located in smog-filled areas, near manufacturing plants or in industrial neighborhoods.

One such facility is the Tire Service Co. in San Jose, Calif. "Being a tire warehouse, we have rubber dust mixed in with the normal smog off the street," Joan Scott, computer systems manager, said. "The mixture of these two substances caused a deposit to get

into the disk and on the disk," causing the firm problems with its drives.

The user first noticed something was wrong "when our printouts started showing strange figures," she said.

A Burroughs Corp. B700 user, Scott had Burroughs look at the disks. The vendor sent an affected disk to its laboratory in Pasadena. The lab analyzed the material on the disk and told the Tire Service Co. exactly what the problem was.

Because the disks needed to be cleaned and refurbished, the user took them to a professional disk cleaning service, completely replaced a few of the platters and cleaned the rest.

At that point Burroughs began to sell a disk cleaning system manufactured by Innovative Computer Products of Tarzana, Calif., and the tire firm decided to buy the unit.

"Because it is handy and in the office, we are in the position to clean the disks as often as we like and, in doing so, we have not had the problem," Scott noted.

She pointed out that almost anyone can clean the disks because all one has to do is to slip the disk into the unit and press a button. Mechanical arms with rubber pads slide across the top and bottom of the disk, cleaning them with a chemical solution.

(Continued on Page 68)

Crocker Banks on Time-Sharing, Installs In-House User Service

Special to CW

SAN FRANCISCO — A mini-based internal time-sharing service has been established at Crocker National Bank here to reduce costs and provide an improved level of service to interactive time-sharing users.

Crocker, the 12th largest bank in the country, found the demand for time-sharing growing dramatically. Users in all areas of the bank were requesting time-sharing services from many firms to satisfy their immediate requirements for interactive DP.

"Our expenditures in the area of financial modeling and reporting were exceeding \$40,000 per month," according to William Reid, vice president of financial planning. "We wanted a system that would reduce our costs, yet would provide us with as useful and flexible a system as we had with the commercial time-sharing services that we were using."

"It was of primary importance that our users be able to exercise the same degree of control over our systems and that they re-

ceive the same level of support that we previously had," Reid added.

Each month, Crocker prepares a comprehensive set of financial performance reports for each of its business areas. These reports comprise the Organizational Profitability System (OPS). The base information for OPS comes from the largest general ledger program, which is run on a bank IBM mainframe.

The Finance Division extracts this information, feeds it via magnetic tape to the time-sharing service and then uses the service's "financial language" to manipulate the information to prepare various analytical reports and consolidations. In addition to this main application, Crocker uses financial languages for numerous other smaller tasks, many of which are derived from information in the OPS data base.

The hardware selection phase for the time-sharing system ensued after a "user case forward" with a dedicated mini production

(Continued on Page 68)

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Washington Set as Site For Minicomputer Courses

WASHINGTON, D.C. — One course on engineering applications for minicomputers and another on minicomputer programming and interfacing techniques will be given at George Washington University here this spring.

Designed to provide a better understanding of the computer engineering applications to systems engineers, engineering managers and others, the engineering applications course, slated for April 26-28, will cover all aspects of systems implementation, a spokesman said.

Hardware selection and configuration, peripheral equipment, interfacing with special equipment and

operations management will be other topics covered. This course costs \$410.

The course on minicomputer programming and interfacing techniques, to be presented April 24-25, is designed for engineers, technicians and others. It will cover the organization, operations and programming of minicomputers. This course costs \$275.

People wishing to take both courses can do so for \$600, the spokesman noted from the Continuing Engineering Education Division, George Washington University, Washington, D.C. 20052.

Crocker Adds In-House T/S

(Continued from Page 67)

accounting system" he wanted to implement, according to Shirley Moore, assistant vice president, Computer Services Department. The user suggested a Hewlett-Packard 3000 system. At the same time, the Computer Services Department was pursuing its own objective of implementing an internal time-sharing system. The department decided the accounting application would fit into its scheme and began looking at alternatives.

It looked at the HP system suggested by its user and the Digital Equipment Corp. PDP-11/70; it also considered putting an interactive monitor on its current mainframes, IBM 370/168s.

The DEC unit was chosen because Crocker felt it was reliable and had a good reputation. The HP was elimi-

nated because while it had a good software reputation, it appeared not to be as reliable in hardware, Moore said. "We weren't happy with the interactive monitor" alternative, she added.

Crocker's in-house time-sharing service is based upon the PDP-11/70 running the RSTS/E operating system. The system is configured with 756K bytes of memory and two 80MB-byte disk drives.

Ross Systems, Inc., a Palo Alto-based services firm, was chosen to provide the financial modeling software and to convert the controller's applications. The firm provided its mini-based financial modeling and reporting language, Maps, to convert OPS.

"Maps" was selected," Reid recalled, "because it provided the same functions as the financial languages available from the other time-sharing firms."

Once OPS was successfully converted, Reid's department selected other related financial systems for conversion, using the experience gained with OPS. Reid's staff has generally been able to convert these applications to Maps without any consulting assistance, he said.

Crocker is also adding two larger applications to the internal time-sharing service — a Customer Account Profitability System (Caps), which will measure the profitability of its corporate banking customers, and a Branch Performance Indicator (BPI) system, which will measure the performance of its 358 branches, throughout California.

Dirty Disks Pose Problem in Office

(Continued from Page 67)

Users of small systems in an office environment should be aware of the potential hazards of allowing their disks to get dirty, she indicated, adding her firm didn't realize it had a problem until it began to feel its effects.

According to DEC's Read, the tire Service Co. was lucky: "No one wants to have to re-create the whole accounts receivable file, for instance."

"When DEC first decided to look into the dirty disk problem, Read recalled, it took a portable disk cleaner to the Los Angeles area to check some 4,000 cartridges, both by looking at them and cleaning them. Not many of the disks were crashed because small system users usually replace the disk."

The big system user with a computer room is much more careful about his information," generally insisting that the place be kept clean. "There tends to be a different attitude in preserving the data," he said.

However, even users in office environment get agitated at the loss of a disk, so DEC recommends that its field service organization be on the lookout for users who have high-risk environments.

"If a person has 10 active cartridges, the retail value of those cartridges is on the order of \$1,500, but the information might be worth several hundred thousand dollars," he pointed out.

"If you look at it from the value of the information rather than the retail value of the cartridges, it's well worth expending 10% of the value of your information to have the ability to clean."

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Cartridge Disk PDP-11-Compatible

ANAHEIM, Calif. — A cartridge disk fully software and media compatible with Digital Equipment Corp. PDP-11 minicomputers is now available from Rianda Electronics, Ltd.

Either complete subsystems, including a selected disk drive, or only the controller with cable can be supplied. Equivalent to the DEC RK05 disk system, the Model 14XX controller is

software compatible with DEC operating system software, the firm said.

When DEC software compatibility is not required, the Model 14XX controller will interface with up to four 10M-byte dual disk drives, either 5440 or 2315 systems (40M bytes total on-line storage), the company added.

Installed in Chassis

The controller is said to be supplied with a system unit suitable for installation in the PDP-11 computer chassis. Also included in the price is a cable to the first disk drive, a software diagnostic routine with listing and an instruction manual.

The controller costs \$3,300 from Rianda Electronics, Ltd., 2535 Via Palma, Anaheim, Calif. 92801.

HP Adds Plot/Print Unit

PALO ALTO, Calif. — A desktop plotter/printer designed to work in systems interconnected with the Hewlett-Packard Co. interface bus is available from the vendor.

The microprocessor-based HP 7245A uses a bidirectional paper drive to advance the chart for plots with Y axes as long as 5,000 mm (16.4 ft). The charts can then be returned to the starting point. Using thermally sensitive roll paper 61 meters (200 ft) in length, the unit is equipped for unattended plotting applications, the firm said.

Varied Applications

Intended for such applications as engineering design, production testing, data acquisition, process monitoring and analytical plotting, the unit features a thin-film printhead. It has 12 resistors to print 7 by 9 half-shifted matrix characters at 38 char/sec in four orthogonal directions. This font allows 88 columns to be printed across

the 216 mm (8 1/2 in.) wide paper. A larger 14x9 matrix font is used to print titles at 19 char/sec in a 44-column format.

Featured is a 128-character Ascii set with 96 upper and lower case characters and 32 printable control characters to ease program debugging, HP said.

The 7245A plotter/printer costs \$4,600 from 1507 Page Mill Road, Palo Alto, Calif. 94304.

Payroll System

Fits on Desktop

DAYTON, Ohio — The Reynolds and Reynolds Co. has developed a desktop-sized payroll system using a microprocessing unit.

The system computes paycheck amounts, all tax and voluntary contributions, net pay and all other payroll data, the firm said.

Compeg 2001 is primarily designed for small businesses that do not have computers or prefer not to use an out-of-house automated payroll service.

The processor contains a 5,000-bit preprogrammed firmware memory.

The system eliminates the need to add and cross-foot the payroll journal because it gives payroll totals at the push of a button, the company said.

The company recommends that the micro-based system be used in conjunction with a manual payroll writing system it has designed. Compeg costs less than \$1,000; the manual payroll writing system costs about \$150 to \$200. Reynolds and Reynolds can be reached through P.O. Box 1005, Dayton, Ohio 45401.

LeBlond Unveils

DG-Based System

CINCINNATI — The LeBlond NC Systems Microapi hardware/software unit is a self-contained, numerically controlled part-programming system that can also be used for general DP work, according to its vendor.

The system is based on a Data General Corp. mini with floating-point hardware and 96K bytes of memory. The system controller is the LeBlond DPS-4000 tape preparation center with standard features, the firm said. It costs about \$60,000.

LeBlond NC Systems is located at 6761 Bramble Ave., Cincinnati, Ohio, 45227.

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Library Picks Micro Over Mini as It Automates

Special to CW
EAST MEADOW, N.Y. — At the public library here, the task of quickly sorting books to be placed on the reserve list, often given to a minicomputer, has been assigned to a microcomputer-based data collection system.

The Automated Library System, designed by Decim Systems, Inc. of Farmingdale, N.Y., was installed in the East-Meadow library for a price estimated by library officials to be one-third that of comparable mini-computer-based equipment.

The micro-driven hardware not only handles the chores associated with the library's reserve-book service, but also deals with the problem of "hot-borrowers" — delinquent library patrons with long-standing fines for overdue books or with long-overdue books in their possession.

Red Light Alert

Each of the library's patrons is given a wallet-sized plastic card punched with a unique six-digit identifier. Whenever a borrower checks out or renews a book, the librarian inserts this card into a terminal located at the front desk, along with a paper card found in the back pocket of the book. This punched paper card carries a seven-digit number identifying the book being checked out.

The librarian keys in whether the book is to be borrowed or renewed and for how long. The on-premises system, powered by a Processing and Control Element (PACE) 16-bit microcomputer card from National Semiconductor, then searches its 5K random-access memory (RAM) to see if the borrower is on the delinquent list. If so, the system sends back an audible tone to the librarian, and a red light comes on.

If the borrower's number is not on the delinquent list, the transaction proceeds normally. Data from the two cards, along with information concerning the length of time for which the book is being borrowed or renewed, is recorded onto a 9-track magnetic tape mounted on a drive installed just beneath the librarian's desk.

Once a week — or sooner, if required — this tape is sent to a central inventory and circulation control system maintained by a number of libraries on Long Island.

This system, based on a Univac mainframe, uses the data collected on the 9-track tape to generate "past due" notices and to set up inventory lists of books on the shelves.

"This central system also provides us with our lists of delinquent borrowers," Coleman said. "Unfortunately, before the installation of the system, this information came to us in form of sheafs of 8-1/2- by 11-inch pages, totalling 200- to 300 names."

As a result, delinquent borrowers were apprehended at the library only if one of the librarians happened to have read over the list and remembered someone's name as a book was being checked out.

The weekly lists from the center are still used in East Meadow's operations. From them, operators using the branch's ASR-33 Teletype terminal update the micro-based system's memory with the numeric identifiers of patrons classified as delinquent, keeping

a paper tape record as back up.

Reserved Books

In the area of reserve books, however, the system is paying for itself at East Meadow. If all copies of a book have already been loaned out, a library patron can put the book on a "reserve" list.

At East Meadow, this list can average 700- to 1,000 books; before installation of the Decim system, sorting the 2,000 to 3,000 books that come in each day was done on a "batch" basis by library pages — part-time high school students.

"With the Automated Library System, however," Coleman said, "we've been able to eliminate the significant amounts of overtime needed."

"We first considered various stripped-down minis to power this system," Alan Rosenthal, director of engineering at Decimcom, said. "In our judgment, none could be cost-justified when compared to the power available from microcomputers."

"In addition to concerning ourselves with higher microcomputer CPU costs — even in large quantities — we had to look at memory hardware costs in terms of what we could get vs. what we needed at a specific site."

With the micro, memory could be tolerated to meet the specific capacities required at East Meadow. "If another library, however, requires 1K more RAM — or 1K less — then we can easily configure the system as required," Rosenthal said.



The system can nab delinquent borrowers as they check out books.

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## Risks, Rewards Balanced

# DDP Impact on User Organization Seen Major

HOUSTON — "There is an emerging view within the banking industry — as well as most other industries — that distributed systems can increase the return on investment of the entire information processing system, from initial data capture to final manage-

ment information generation.

"Experience is showing that these systems, when appropriate, can be implemented more quickly to meet immediate local operations needs, often at lower cost," Donald T. Winski, manager of management advisory services at Price

Waterhouse Co. told a recent banking conference here.

Certain business characteristics are present when the distributed data processing (DDP) approach is found appropriate. "These characteristics fall into four major categories: the information processing logic, the data base, the information timing requirements and the deployment of the end-user personnel," Winski explained.

### Unique Logic

If the logic needed for a specific banking operation is unique, it is more likely the application can be effectively distributed. Further, if a data base is subject to limited access by a small number of users rather than wide-ranging access by a large number of people, it can be more effectively distributed, he pointed out.

"Where there are dissimilar timing needs, for example, a real-time necessity at the branch level but a daily or weekly necessity for information at the central office, it will likely be less costly to provide on-line distributed processing for the daily real-time applications while providing centralized batch processing for the more concentrated information needs," he said.

If the end users of a system are dispersed, geographically distributed processing tends to be more of an alternative. "There is a greater tendency toward keeping application systems on a single large mainframe when all people are within one location," Winski noted.

When people discuss distributed systems, confusion arises, according to Winski. "We often encounter a preponderance of one-dimensional reality," he said, because people tend to put central control at one end of a spectrum and decentralized systems at another.

However, distributed processing really has three dimensions:

- The degree of centralized organizational responsibility.
- The extent of physical computer deployment.
- The number of DP functions that are to be handled.

"The DP responsibility dimension ranges from total centralization to total decentralization; the computer deployment dimension ranges from a single consolidated mainframe to a totally distributed minicomputer network," he said.

Actually, Winski noted, extremes are not likely to occur. At some point, the systems architecture will become synchronized with the overall organizational architecture.

### Possible Environments

According to the consultant, four major DP environments can be represented within the two-dimensional responsibility/deployment matrix:

1. In the centralized responsibility and consolidated computer equipment situation, "we are basically defining the current classic management information system (MIS) environment."

2. In situations where the equipment is consolidated but responsibilities are totally decentralized with the end user, "we have what we normally view as a service bureau environment."

3. In a number of banks "we are seeing a balance between distributed and consolidated computer equipment with the responsibility for the data processing functions still within a centralized MIS group. We call this a virtual MIS environment."

4. There have been some cases where total end-user orientation exists. "In these cases, the end-users are being held responsible as part of their total profit-center responsibility, for the development, operation and control of their systems."

In many cases, minicomputers are being placed into the user environment and the user is held responsible for the system operations. Local users are also doing some systems development, Winski said.

In almost all cases there is either a formally defined or implied management policy of centralized control," he stated.

"This control considers such factors as cost-benefit justification, adherence to necessary standards and proper interfacing between adjoining application systems."

### Impact on Organization

For top management, DDP's impact will primarily be one of "risk analysis," with management trying to balance risks and rewards. For every potential advantage, "there will also be a potential shortcoming," Winski said.

"An MIS organization will be reshaped by DDP, transformed into a 'higher quality, less populated elliptically shaped MIS operation,' he predicted. All operational responsibilities and much of the programming as well as the maintenance will revert to the user; the MIS department will have a 'greatly expanded' technical support and quality assurance" function, becoming an "internal consulting organization," he said.

Will users be able to handle the new responsibilities? To get them ready, "some planned turnover may be necessary" in order to assure an adequately trained and "conditioned" user population, Winski believes.

Users will have to turn to the MIS organization, their own staff or outside contractors for programming and system design help. "The technical knowledge required in implementing a particular system will be the controlling factor, he said.

Internal auditors will also be impacted by the distributed approach. "Paper-oriented auditors ... are being replaced with highly sophisticated DP-oriented individuals. These auditors must know mini/microcomputer technology and network communication systems."

"The key to the successful use of distributed systems involves the proper organizational blending of centralized controls and decentralized responsibilities," he summarized.

"This will provide the entire organization with the means to properly exploit the use of distributed systems in a timely fashion so a significant increase takes place in the return on the systems investment."

"By properly aligning our systems architecture with the architecture of our particular banking organization, we can provide the necessary synchronization required to provide management with better information, while breaking down the service barriers that are preventing us from expanding our business in a more profitable manner," he concluded.

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# Predicted Koch Election to .5% Pollster With Micro Gets Fast Results

By Tim Scannell  
— CW Staff

NEW YORK — A polling firm with a micro-computer system predicted last November's election of Edward Koch as New York City mayor within .5% of the tabulated vote.

Penn & Schoen Associates used the micro to analyze data received in countless random telephone calls and through hours of door-to-door canvassing. Combining the system with traditional polling techniques meant it could get results the same day a poll was taken, according to Mark Penn, a partner in the firm.

"It's ridiculous to wait a week while raw data is being keypunched and fed into a large computer to be analyzed," Penn remarked. "If there is a flaw in a question or a poll taker doesn't understand what to do, you might not see the problem until a week of mistakes has occurred."

Because "all the results that follow have to be suspect until the problem has finally passed," the credibility of the entire survey can be damaged, he explained.

Although Penn, who is also a law student at Columbia University, felt an interactive computer system could be of great use in monitoring the poll and determining problems in advance, he was at first hesitant to purchase a computer because of the cost. Political campaigns are notoriously strapped for cash and polling, because of the labor involved, is already very expensive, he noted.

## Retail Solution

The solution, Penn found, was to purchase a personal computer system. He chose a Sol Terminal Computer Model 20 with a North Star Computers, Inc. minidisk drive after looking over several systems at the Computer Corner, a computer store in nearby White Plains, N.Y.

"We decided upon the Sol 20 because it's a complete computer with a keyboard and printer output built in," he said. "The North



Soon-to-be-elected New York City Mayor Edward Koch (left) joined Mark Penn to analyze polling data before last November's contest.

Star disk, although low in storage capacity, had the lowest price for any disk system... and it also had a good extended disk Basic interpreter."

The programs used to analyze the polling data were written by Penn using the language contained on the disk system.

The computer was used weeks in advance of the election to keep track of the various percentages and results being received. It was also programmed to uncover unusual surges in popularity that might occur because of "extraordinary media coverage" or exposure of a candidate, Penn said.

"Instant poll results are almost unheard of in our profession, but with our personal computer we achieved it," he stated. "We used [the system] to run the whole show that week be-

fore the election and continued to use it as the major data processing element throughout the rest of the campaign."

"The computer was busy, even on election night, tabulating results from sample precincts," he continued.

Hardware problems that might have been disastrous, were overcome with the Computer Corner's assistance, Penn said. "We had two hardware failures, one of which happened on the Sunday before the election. The Computer Corner opened the store Sunday night just to repair a defective memory board and also replaced the disk drive," which had stopped operating.

"Had we not purchased our computer from a computer store, we would have been in real trouble," he added.

## Course on Micros Set for Anaheim

SANTA MONICA, Calif. — A five-day series of courses designed to acquaint participants with the fundamentals as well as the technical aspects of microcomputers will be offered in Anaheim, Calif., on May 15-19 by Integrated Computer Systems, Inc.

The series will discuss technical definitions, software development, documentation, component and product reliability and criteria for choosing the right micro-computer, a spokesman said.

Also covered will be interfacing techniques, control logic, system testing and programming languages, he added. Software design and development as well as documentation will be detailed.

Emphasis will be placed on a step-by-step teaching approach so participants can apply methods to their own projects.

The courses can be taken individually or in combination. Tuition ranges from \$195 for a one-day seminar to \$695 for the complete sequence.

The series will also be held in Philadelphia on May 8-12, Washington, D.C., on May 15-19, Toronto on June 5-9, Boston on June 12-16 and at various other locations across the country. Additional information can be obtained from Integrated Computer Systems, 3304 Pico Blvd., P.O. Box 5339, Santa Monica, Calif. 90405.

## Book Surveys Available Gear, Offers Acquisition Guidelines

NEW YORK — A book that details the hardware and software presently available in the microcomputing field as well as the guidelines necessary for selecting the right equipment has been published by the Van Nostrand Reinhold Division of Litton Educational Publishing, Inc.

C.V. Rao's *Microprocessors and Microcomputer Systems* discusses such topics as the use of silicon in microcomputer technology, the organization of low-cost computer systems, bubble memories, charge-coupled devices and data communications, according

to a spokesman.

The book features numerous reference charts containing comparative data along with over 150 illustrations and diagrams, he added. It was published to facilitate communication between hardware and software specialists, marketing and training personnel, students, faculty and laymen alike, the publishing firm noted.

The 286-page book is priced at \$24.50 from the publisher at 450 W. 33rd St., New York, N.Y. 10001.

## Dispenser Holds Wire Solder

DANBURY, Conn. — Micro Electronic Systems, Inc. has a universal wire solder dispenser, suitable for hobbyist applications that can reportedly accommodate solder sizes ranging from .015- to .062 in.

Hand-Y-Feed comes in two versions: with a magazine, in which the solder is wound around a coil in the unit and fed from the bottom up through the center; and without a magazine, in which the solder is fed directly from the spool to the unit.

A metal nozzle is included to protect the unit should a soldering iron get too close, the firm noted.

Hand-Y-Feed is priced at \$7.50 for the nonmagazine version and \$8.65 for the mag-

azine version from the firm at 8 Kevin Drive, Danbury, Conn. 06810.

## Hobbyist Plugs Fit DIPs

BRONX, N.Y. — The OK Machine and Tool Corp. has unveiled a line of 14- and 16-pin plugs designed to fit into DIP sockets for hobbyist and prototype applications.

The plugs, included with covers, feature glass-filled thermoplastic bodies and solder lugs with slots on the top side for attachment of cable leads, the firm said.

Packed two to a package, the plugs cost \$1.45 (14-pin units) and \$1.59 (16-pin version). OK Machine is at 3455 Conner St., Bronx, N.Y. 10475.

MICROCOMPUTING

**MODE, BURST** — The movement of a continuous bit stream between devices until an interruption or completion of the stream occurs.

**MODE, BYTE** — Refers to the movement of one byte at a time between devices, separated by an interrupt and release of channel control. Used in multiplexing, the byte mode permits the handling of data from several low-speed devices simultaneously.

**MODEM** — Refers to a Modulation/DEModulation chip or device that enables computers and terminals to communicate over telephone circuits.

**MPU** — Microprocessor unit.

**MTBE** — An abbreviation for mean time between failures.

**MULTIPROCESSING** — 1. Refers to various computer configurations consisting of more than one independently initiated processor, each having access to a common, jointly addressable memory. 2. Processing several programs or program segments concurrently on a time-share basis. Each processor is only active on one program at any one time while operations such as input/output may be performed in parallel on several programs. The processor is directed to switch back and forth among programs under the control of the master control program.

**MULTITASKING** — Refers to procedures in which several separate but interleaved tasks operate under a single program identity; differs from multiprogramming in that common routines and data space as well as disk files may be used. May or may not involve multiprocessing.

**NANOSECOND** — A measurement equivalent to one billionth of a second ( $10^{-9}$  second).

**N/C SYSTEM (NUMERIC CONTROL)** — Refers to a system which uses prerecorded intelligence prepared from numerical data to control a machine or process. The N/C system consists of all elements of the control system and of the machine being controlled that are, in fact, a part of the servomechanism.

**NETWORK** — 1. A combination of elements. 2. An interconnected system of transmission lines that provides multiple transmissions between loads and sources of generation. 3. A series of points connected by communications channels. 4. The switched telephone network is the network of telephone lines normally used for distant telephone lines. 5. A private network is a network of communications channels, confined to the use of one customer.

From Microcomputer Dictionary & Guide by C. J. Nigpi and D. A. Kidd. Used with permission of Matrix Publishers, Inc. 807 Kenyon Road, Champagne, Ill. 61820

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# Mini/Micro

## THE MINI/MICRO COMPUTER CONFERENCE AND EXPOSITION

APRIL 18-19-20 · CIVIC CENTER · PHILADELPHIA

### Tuesday APRIL 18

MORNING: 9:30 A.M. - Noon

1. PROGRESS IN MICROPROCESSOR GAMES AND HOME COMPUTERS  
Organizer/Chairman: Jerry Elminder - Electronic Engineering Times

2. HOW TO MAKE IT AS A MINICOMPUTER DISTRIBUTOR  
Organizer/Chairman: W. Mathews - Randel Data Systems

3. MICROCOMPUTER SOFTWARE DEVELOPMENT: CHOOSING AMONG THE DIFFERENT METHODS  
Organizer/Chairman: Carol Anne Oglin - Software Techniques, Inc.

4. CONTRIBUTED PROCESSING  
Organizer/Chairman: Roger Billings - Billings Computer Corp.

AFTERNOON: 1:30 P.M. - 4:00 P.M.

5. SMALL BUSINESS SYSTEMS  
Organizer/Chairman: Don Schmitt - Safe/Four Corp.

6. PHILOSOPHY OF COMPUTER NETWORK TROUBLE SHOOTING  
Organizer/Chairman: Frank Urban - Hewlett-Packard

7. 16-BIT MICROCOMPUTERS  
Organizer/Chairman: Edward J. Zander - Data General

8. DESIGN APPROACHES TO SELECTING PRE-FABRICATED PACKAGES  
Organizer/Chairman: George Benoit - Zora Corp.

### Wednesday APRIL 19

MORNING: 9:30 A.M. - Noon

9. INDUSTRIAL MICROCOMPUTER NETWORKS: FACT OR FICTION  
Organizer/Chairman: Dwight Carlson - Process Computer Systems -

10. MINICOMPUTER APPLICATION LANGUAGES  
Organizer/Chairman: Michael Lebada - Computer Automation

11. GRAPHIC DISPLAYS FOR THE OEM SYSTEMS BUILDER  
Organizer/Chairman: John LaVare - Tektronix

12. CRITERIA USED IN SELECTING AND EVALUATING A MINICOMPUTER  
Organizer/Chairman: John P. Gallagher - A.O. Smith Corp.

AFTERNOON: 1:30 P.M. - 4:30 P.M.

13. MICROCOMPUTERS AND THE ENERGY CRISIS  
Organizer/Chairman: Al Vitale - Control Logic Corp.

14. GETTING INTO THE SMALL SYSTEMS BUSINESS  
Organizer/Chairman: Michael Levy - Jettix

15. THE MICROCOMPUTER SOFTWARE CRISIS  
Organizer/Chairman: Andrew A. Allison - Consultant

16. COMPUTER GRAPHICS WITH MINIS/MICROS  
Organizer/Chairman: Carl Machover - Carl Machover & Associates, Inc.

### Thursday APRIL 20

MORNING: 9:30 A.M. - Noon

17. THE EMERGING ROLE OF THE MICRO-PROCESSOR IN MATERIAL HANDLING  
Organizer/Chairman: John M. Hill - Computer Industries Corp.

18. ALTERNATIVE MINICOMPUTER SYSTEM ARCHITECTURES  
Organizer/Chairman: Malcolm Stiefel - Miro Corp.

19. BUSINESS AND ENTREPRENEURIAL OPPORTUNITIES IN MINIS AND MICROS  
Organizer/Chairman: Stanley Klein - Mini-Micro Systems

20. SMALL OSK MEMORY TRENDS  
Organizer/Chairman: Robert Heizer - CalComp

AFTERNOON: 1:30 P.M. - 4:30 P.M.

21. MINIMICRO INTERFACE TESTING  
Organizer/Chairman: (To be announced from Hewlett-Packard)

22. FIXED OSK TECHNOLOGY FILES & REMOVABLE DISK TECHNOLOGY FILES  
Organizer/Chairman: Bud Blainier - Microdata Corp.

23. MICRO-BASED CUSTOM TERMINALS AND SYSTEMS  
Organizer/Chairman: Martin S. Albert - Custom Terminals Corp.

24. NEW DIRECTIONS FOR THE SMALL SYSTEMS USER  
Organizer/Chairman: Ed Bride - Hewlett-Packard

### MINI-MICRO AUDIENCE PROFILE (By Area of Interest)

|                             |                       |         |
|-----------------------------|-----------------------|---------|
| Year: 1976                  | Year: 1977            |         |
| Location: San Francisco, CA | Location: Anaheim, CA |         |
| Attendees: 8,948            | Attendees: 9,177      |         |
| Area of Interest            | Percent               | Percent |
| Components                  | 7.66                  | 6.96    |
| Comp. Sys. - Digital        | 12.92                 | 12.18   |
| Comp. Sys. - Spec. Purp.    | 6.23                  | 6.13    |
| Consulting Service          | 2.48                  | 2.78    |
| Data Comm. Equip.           | 6.14                  | 6.39    |
| Data Comm. Equip.           | 3.36                  | 3.90    |
| Per Equip.-CRT Disp.        | 9.21                  | 9.64    |
| Per Equip.-Mag. Tape        | 6.52                  | 6.89    |
| Per Equip.-Mem. Sys.        | 7.10                  | 7.37    |
| Per Equip.-Printers         | 8.22                  | 8.40    |
| Per Equip.-Punch/Read       | 6.22                  | 6.76    |
| Source Data Collect.        | 6.97                  | 7.17    |
| Supplies/Accessories        | 4.48                  | 5.09    |
| Test Equip.                 | 2.97                  | 2.49    |
| Time Sharing Sys.           | 2.20                  | 2.27    |
| Time Specified              | 16.83                 | 17.07   |

In less than two years the MINI-MICRO COMPUTER CONFERENCE has attracted attendees from virtually every state in the country plus many foreign countries. The MINI-MICRO EXPOSITION has also served the prospective "trade fair" designation by the U.S. Department of Commerce.

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Following is the registration fee schedule:

|                                 | Advance       | On-Site |
|---------------------------------|---------------|---------|
| 3-Day Conference and Exposition | \$60          | \$75    |
| 1-Day Conference and Exposition | \$25          | \$30    |
| Exposition Only                 | Not Available | \$5     |

Please use the form provided for advance registration. Your completed credentials will be prepared and waiting for you at the special Advance Registration Center in the Philadelphia Civic Center on the day you specify.

### LIST OF EXHIBITORS (As of February 16)

|                             |                              |                               |                                         |
|-----------------------------|------------------------------|-------------------------------|-----------------------------------------|
| Mini-Micro Systems Magazine | Teletype Corp.               | General Robotics              | Cipher Data Products, Inc.              |
| Minicomputer Accessories    | Taylor                       | Diagpro Research              | Okidata                                 |
| Computer Drivers            | Texas Instruments            | Tally Corp.                   | Houlihan Systems Corp.                  |
| Computer Magazine           | Tribe I, Inc.                | Data I/O Corp.                | Computer Automation                     |
| IEEE Computer Society       | Wall Brothers Research Corp. | Infocom                       | Computer Design                         |
| Micro Peripherals Inc.      | Applied Digital Data         | Intertek                      | Products Div.                           |
| Memorex                     | Anderson Jacobson            | Houston Instruments           | 3M Co. - Microfilm Div.                 |
| Magnetek Corp.              | Tektronix, Inc.              | Data 100 Corp.                | Bentley Publishing Co.                  |
| MOB Systems                 | Telus Systems                | Honeywell Information Systems | Electronic Memories & Replicas          |
| Computer Operations, Inc.   | Summagraphics Corp.          | Dataram                       | Systems Furniture                       |
| Computerworld               | Binatone                     | Digital Equipment Corp.       | Hewlett-Packard (Colorado Springs Div.) |
| Convec Corp.                | Diag-Log Systems, Inc.       | Dig Data Corp.                | Basic Business Systems                  |
| Law Singer                  | Small Systems World          | Compuserve                    | Centra                                  |
| International Microsystems  | Raymond Engineering Inc.     | 'tenda Data Corp.             | Small Business Computers                |
| Intermet                    | Printonics                   | Electronic Engineering Tech   | Hayden Publishing                       |
| Central Logic Inc.          | Caltek Manufacturing Co.     | Able Computer Technology      | Electronic Representatives Association  |
| Datallux Corp.              | CalComp                      | Vetco Data Products           |                                         |
| Data General Corp.          | Chambers Publishing Co.      | Amnux                         |                                         |
| Intel Memory Systems        | Praxis Ltd.                  | Ampex Corp.                   |                                         |
| Intelligent Systems Corp.   | Plasma Peripheral Systems    | Ampex Inc.                    |                                         |
| Data Systems Design         | CNC Marketing Corp.          |                               |                                         |

### MINI/MICRO COMPUTER CONFERENCE AND EXPOSITION PHILADELPHIA, PENNSYLVANIA, APRIL 18-19-20, 1978

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Your completed credentials will await you at the Advance Registration Staff in the Philadelphia Civic Center  
Please Note: ADVANCE REGISTRATIONS MUST BE RECEIVED BY APRIL 12.

## Short Course, Workshop Set for Washington, D.C.

WASHINGTON, D.C. — Two three-day courses covering the basic principles of microcomputers and micro-processing systems will be held here at George Washington University on April 19-21 and May 24-26.

The first course, "Microprocessors," will deal with the technology and specifics of the Intel 8080 and Motorola M6800 microcomputer systems. Through the detailed study of these machines, participants should acquire a working knowledge of basic microprocessor terminology, concepts and applications, according to a spokesman.

The "Microprocessors and Microcomputers Workshop" will be divided

between lectures and hands-on practice. The workshop will focus on the hardware, structure, architecture, software, capabilities and limitations of the average microprocessor, the spokesman noted. An M6800 system will be used to demonstrate principles.

A basic knowledge of at least one programming language is the only prerequisite suggested for attending these classes, the spokesman added.

The fees are \$405 for the in-depth course and \$390 for the workshop. Additional information and registration materials are available from Martha Augustin, Continuing Engineering Education, George Washington University, Washington, D.C. 20052.

## Intel Doubles SBC Program Memory

SANTA CLARA, Calif. — Intel Corp. has announced the 80/10A, a single-board computer (SBC) with up to 8K bytes of nonvolatile read-only memory and a programmable parallel and serial I/O capability.

The 80/10A, constructed on a 6.75-by-12-in. printed circuit board, contains the Intel 8080A MPU, system clock and 1K byte of read/write random access memory, a spokesman said.

Using either the 2758 erasable programmable read-only memory (Eprom) for a 4K-byte capacity or the 2716 Eprom for 8K bytes, the 80/10A's board power consumption is 10% less than that of its predecessor, the 80/10, the firm noted.

Because of the 80/10A's I/O capability,

ties, different equipment and configurations can be accommodated by changing a few program instructions and plugging in the appropriate line drivers and terminators, the firm claimed.

The SBC 80/10A sells for \$495 from the firm at 3065 Bowers Ave., Santa Clara, Calif.

## Intel Cuts Costs Of SBC Devices

SANTA CLARA, Calif. — Intel Corp. has announced several price reductions effective immediately on its SBC 80/20 and related single-board computer (SBC) products.

The SBC 80/20 has been reduced from \$895 to \$735; the 80/20-4 from \$995 to \$825; and the 80/20 prototype package from \$1,495 to \$1,350.

The system 80/20-4 has also been cut from \$1,895 to \$1,725, a 9% reduction.

The SBC 016, 032, 048 and 064 random-access memory (RAM) boards have been reduced from \$975 to \$825; \$1,650 to \$1,360; \$2,300 to \$1,860; and \$2,950 to \$2,200, respectively.

The SBC 104, 108 and 116 combination RAM, erasable programmable read-only memory (Eprom) and I/O expansion boards have been cut from \$775 to \$715; \$895 to \$815; and \$1,100 to \$985, respectively. The SBC 517 combination I/O board has been reduced from \$425 to \$400.

## Memory Board Built for 6800

WESTLAKE VILLAGE, Calif. — A 16K by 8-bit semiconductor memory system designed for use with Motorola Semiconductor Products, Inc.'s Exorcisor and Motorola Corp.'s 6800 evaluation module has been released by Christen Industries.

The Cl6800 can be expanded to 32K, 48K or 64K by interchanging the 4K by 1-bit dynamic memory chip with its 16K equivalent, the firm stated. The memory board plugs directly into existing Exorcisor connectors, a spokesman said.

The Cl6800 features a hidden refresh control logic and offers a data access time of 300 nsec and a cycle time of 750 nsec, he said.

The board is priced at \$390 for the 16K by 8-bit version and \$1,230 for the 64K by 8-bit model. Quantity discounts are available, Christen said from 31312 Via Colinas, Westlake Village, Calif. 91361.



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## CCIA-Type Firms Targeted

## SBA Promises Help to Capital Seekers

By Edith Holmes

CW Washington Bureau

WASHINGTON, D.C. — An official with the Small Business Administration (SBA) recently assured members of the Computer & Communications Association (CCIA) they can expect more help from the agency in their search for capital.

Addressing the association's Fifth Annual Caucus here, Peter F. McNeish, deputy associate administrator for investment at SBA, noted that few CCIA members currently fall into the agency's definition of a "small business." "But you are small within your own industries. You are in direct competition with billion-dollar giants," McNeish said.

"You have the same disadvantages the typical small company has in obtaining capital, the same struggles with government regulations and paperwork, and some of the same discriminations in tax law to contend with," he added.

## 'One of Us'

The SBA official pointed out that not one of CCIA's members has as much as 1% of the computer or communications market. "So you are, in effect, one of us, and you are entitled to ask why SBA doesn't do more about your predicament. Why don't we use more liberal standards to define 'small'? Why do we hold to size standards of our own making which exclude some of you from our support programs?" he asked.

McNeish promised help, but said it is likely to come slowly. When SBA was created 25 years ago, Congress intended it to bring economic justice to the "Mom and Pop types of enterprises," he explained.

At that time, "nobody could conceive of a time... when multimillion dollar companies would be kicked around by even bigger businesses and bigger government and need SBA's help," McNeish said. As a result, the agency's basic concepts and procedures need realignment, and that will take time, he suggested.

In addition, SBA's lack of involvement in the computer and communications industries to date is attributable, in part, to the fact that many industries are dominated by a handful of companies. McNeish told the CCIA that while the imbalance in their industries is extreme, it is not unique.

"I would be the first to agree that your needs generally deserve high-priority attention. You are caught between the devil and

the deep blue sea when you are too big to get support from SBA and not big enough to make it on your own in case some big competitor decides to put the squeeze on you," he stated.

To assure his audience that SBA is aware of their problems, McNeish enumerated them. He said the agency knows CCIA-type companies are outcasts on Wall Street when it comes to raising equity capital through the organized securities markets because of the preference there for big name company stocks; that they are frozen out of much of the institutional investment market under the "prudent man rule," which operates on the theory that "bigger is safer" and that investments of pension funds should not be made outside the top 50 companies; and that they are the recipients of a "high risk" rating because of their vulnerability to price-cutting attacks by the big competitors.

The SBA official cited a task force report commissioned by his agency to look into the



Opp Photo by S. Holmes

Peter F. McNeish

difficulties associated with raising equity and venture capital.

Quoting from the report, McNeish said, (Continued on Page 78)

## Carter's '79 Tax Plans Offer Little Relief for CCIA Types

By Edith Holmes

CW Washington Bureau

WASHINGTON, D.C. — President Carter's proposed economic package for fiscal year 1979 calls for a reduction in taxes on business that would benefit computer and communications firms, the Computer & Communications Industry Association (CCIA) was told at its Fifth Annual Caucus here recently.

But the President's program offers little else for the small and medium-size firms represented by the CCIA, according to its president, A.G.W. (Jack) Biddle.

If Congress approves the Carter tax proposals, corporate tax rates would drop — effective Oct. 1 — from 20% to 18% on the first \$25,000 of income, from 22% to 20% on the next \$25,000 and from 48% to 45% on taxable income over \$50,000 according to Emil M. Sunley Jr., deputy assistant secretary of the Treasury for tax policy.

In 1981, an additional 1% would be lopped off taxes on income over \$50,000, making that total tax 44% annually. If adopted, these rates would be permanent, Sunley stated.

While these changes in tax rates will lower

the overall business taxes paid by about \$6 million, the same tax reduction applies to companies of all sizes, according to CCIA member Raymond P. Kurshan, chairman and president of Management Assistance, Inc.

Kurshan, who on behalf of the CCIA attended a recent White House briefing for groups representing small and medium-size businesses, noted the Administration "had no coherent response" when asked why a greater tax break wasn't given to smaller enterprises along the lines of individual income tax rates.

Appearing at the caucus from the Small Business Administration (SBA), Peter F. McNeish, deputy associate administrator for investment, said his agency believes Carter's plans for the double taxation of dividends and the investment tax credit "are one-sided propositions favoring big business and offering very little relief to small business."

"Elimination of the double tax on dividends means nothing to the owners of a typical small company because every dime of earnings is being plowed back into the busi-

(Continued on Page 80)

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# SBA Promises to Help Venture Capital Seekers

(Continued from Page 77)

"A hypothetical company moving through the system must reach a revenue level of up to \$10 million before public financing becomes even remotely possible. Moreover, it is not until a business reaches revenues of \$25 million to \$40 million that all sources of public and private financing become, in some measure, available."

SBA is "pressing for action" on task force recommendations that would involve the agency in multimillion-dollar range companies, such as those belonging to the CCIA, he said.

Among SBA's attempts to unclog the flow of capital to small and medium-sized businesses is its proposal to raise the ceiling on the amount of money firms can raise in the public securities

markets from \$500,000 to \$3 million. The Securities and Exchange Commission (SEC) is considering this move and additional restraints on the fees that lawyers, certified public accountants and the like can obtain during this fund-raising process, McNeish reported.

## Loan Selling Urged

The agency is also trying to channel institutional funds into small business by encouraging commercial banks to get more deeply into selling loans that are 90% guaranteed by the federal government, thus freeing more bank funds for additional loans.

McNeish has particular hope for this "secondary market approach" to raising venture capital. Most of SBA's

lending is done with a 90% guarantee to a bank, making the loan guarantee almost the equivalent of a government bond, he explained.

The brokerage community is willing to buy that 90% guarantee from the bank and include payment to the bank for its services. The broker can then turn to one of its customers and require a premium for the customer's purchase of the government-backed paper.

A bank that makes a loan of \$100,000 under the auspices of SBA, for example, can then sell \$90,000 of the loan. The brokerage community pays the money right into the bank's coffers, and the bank can go out and make another \$100,000 loan where 10% of the risk is the bank's and 90% is

the government's, McNeish explained.

Banks are just beginning to catch on to this secondary market for loans, he added. This kind of cooperation between the banks and government will enable the banks to lend nine times more than they could if they held on to the government-backed paper. The government is interested in the program because it is a way of helping to reduce unemployment.

## SBIC Source

SBA's Small Business Investment Companies (SBIC) are yet another source of long-term loans and equity capital for small business, McNeish said.

Combining private capital and government leverage, SBICs can obtain SBA-guaranteed debt not amounting to three times their paid-in capital and surplus. Those SBICs which offer venture capital financing can get four-to-one SBA support.

SBICs are also permitted to buy into the ownership of a firm, McNeish stated.

Congress has shown particular interest in the SBIC program, and new legislation governing SBIC lending arrangements proposes that more money be directed into high-technology companies, especially where innovation is involved, the SBA official said.

McNeish's agency is also trying to help reduce the burden of government regulations and red tape on small enterprises. Key targets of this program have been Occupational Safety and Health Administration (Osha) regulations and those rules accompanying the Employment Retirement Income Security Act (Erisa).

McNeish hopes SBA's efforts contributed to Osha Head Dr. Eula Bingham's and Labor Secretary Raymond Marshall's recent declaration of "an end to Osha's frivolous nuisances." Bingham has appointed a small business assistant in her office and cut down Osha regulations by nearly one-third, he reported.

Meanwhile, the Internal Revenue Service has embarked on a simplified plan for small business compliance with Erisa regulations, McNeish noted.

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## Expansions

Mohawk Data Sciences has opened a software development laboratory in Los Gatos, Calif.

The Computer Products Division of Electronic Memories & Magnetics Corp. has expanded its facilities to more than 60,000 sq. ft. Its mailing address is now 2311 W. El Segundo Blvd., Hawthorne, Calif. 90250.

Computer Performance Implementation, Inc. of Waterloo, Ont., has opened its European marketing and support office in Frankfurt, West Germany. The firm's address is Justintanstrasse 22, Am Holzhausen-Park.

Perkin-Elmer Corp.'s Terminal Division plans to increase its Morris County, N.J., operations with a 105,000-sq-ft building on a 37-acre industrial site on Rt. 206. This facility will house the division's administrative and development offices and its manufacturing operations.

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# Carter's '79 Economic Plans Hold Little Relief

(Continued from Page 77)  
ness, without declaring dividends, he maintained.

"On top of that," McNeish continued, "what happens when any tax is eliminated is that the people over at the Treasury Department always come up with some new kind of a grab to make up for lost revenues. Whatever they come up with is sure to hit small business in some new spot, so the small firm pays more and gains nothing."

McNeish added that the investment tax credit is similarly valuable to the big company able to invest heavily in such fixed assets as private jet aircraft for corporate executives. The smaller firm with meager capital resources has a much harder time enjoying this tax credit's benefits.

## One-Year Benefit

The SBA does not oppose the elimination of the double tax on dividends or the investment tax credit. The agency is arguing that these tax relief proposals be balanced with some kind of relief in which small business can share, the SBA official said.

Enacted in 1977, the employment tax credit serves such a purpose, according to McNeish. Small and big companies alike can reap benefits from this measure, which gives companies a tax credit for every addition they made to total employment in 1977 over 1976.

But the employment tax credit, which McNeish contended has potential for relieving hard-core unemployment, was authorized for one year only, and the Treasury Department has opposed its renewal. "Its loss will increase the tax law's imbalance against small business," McNeish said.

## Capital Gains

An allowance for capital gains is another form of relief that applies to small business as well as big business, he stated.

The Carter economic proposals would include some tax relief to companies experiencing capital gains, but the Administration "was reasonably oblivious to the fact that by diluting the capital gains provision in its tax plan, it has

created a deterrent to capital investment and formation," Kurshan said.

The SBA's McNeish also expressed concern about the tax-free merger provision on the basis that it "is responsible for some of the gobbling up of small firms by big business."

"Take the theoretical example of a successful small business owner who reaches retirement age and finds no one in the family interested in tak-

ing over the reins. The owner has a choice: merge the business tax-free with a larger company or sell it to someone outright and pay a tax," he said.

"In many cases, the bigger company is interested only in taking over the small firm's product or perhaps even intends to discard the product and just take the surplus," McNeish added. "The tax then becomes a penalty for

keeping the business alive."

SBA is critical of the provision, fully realizing that small business itself sometimes wants the tax-free merger.

"We must find more and better ways of making such mergers unnecessary and getting real liquidity for the equities of small companies," McNeish said.

Kurshan reported to the CCIA members that the Carter Administration expects to

achieve a moderate annual economic growth of between 4% and 5% after inflation, with unemployment decreasing by .5% each year.

The Administration will establish no "grandiose public work projects to sop up unemployment," relying on the private sector instead.

The President hopes to reduce inflation through selective tax cuts and increases.

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## Eyes Nontraditional Markets

# DEC Set to Explore New Waters With Its 2020

By Esther Surden

CW Staff

**NEW YORK** — With its introduction of the Decsystem-2020 — a low-end mainframe that doesn't require special power or cooling considerations — Digital Equipment Corp. expects to explore some waters rarely charted by mainframes.

In particular, the firm is

looking at "emerging" nontraditional marketplaces for this system, according to William Kiesewetter, product line manager for the system introduced two weeks ago [CW, March 6].

### Possible Niche

One of these emerging areas is turnkey systems. "We anticipate commercial systems

houses will add value" to the 2020 and remarket it, taking advantage of the system's capabilities, Kiesewetter said. Although DEC is heavily in this market area with its minis, it is not an area in which most mainframes thrive.

Another market not usually attacked by mainframes is government, especially in

such areas as defense. DEC anticipates the system's use in command, communications and control applications.

### Services Application

Because of its distributed data processing capability, the small mainframe may also find a niche in the computer services area.

"By using the 2020 as a dis-

tributed host on their networks, it becomes possible [for computer services] to allow their customers to run all of their application software previously supplied from central facilities on their local system," he noted.

Traditional market areas for the system include the installed base of Decsystem-20s and Decsystem-10s, Kiesewetter continued. Because the system runs both the Tops-20 and Tops-10 operating systems and will operate under Decnet, it will be useful in distributed processing applications and save the user's investment in software, he pointed out.

### Other Market Areas

Educational, governmental, engineering, scientific and commercial market areas, long the bailiwick of DEC's mainframes, will also be served by this system, he noted.

Because it is a "general-purpose" machine, DEC expects the system to replace the batch systems of those who want to add interactive capability. The vendor also expects the system to be used as an in-house time-sharing system by users needing that capability. DEC has pointed to the system's general-purpose nature, its 30-bit word length, its multiple language capability and its software compatibility with the larger members of the Decsystem-20 line as the reasons it is being called a mainframe rather than a minicomputer.

### Particular Target

Minis, one spokesman said, are generally targeted at a particular application which they do very well, such as real-time processing, while mainframes must do all applications well.

Competitors for the 2020 will only "occasionally" be high-end minicomputers, according to Kiesewetter, and DEC does not anticipate too much overlap between its PDP-11/70 and VAX and the 2020. Most frequent competitors in the marketplace would be the Honeywell Information Systems, Inc. Level 62, Univac 90/50, IBM's high-end System/3 models and the IBM 370/115.

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## Israel Seen Good Site for DP Firms

By Jeffrey Beeler  
 CW Staff

HAIFA, Israel - Low labor costs and a strategic location make Israel an attractive setting for U.S. computer companies to develop, manufacture and market their products abroad, according to Dr. Alan Reiter, managing director of Reiter Software Systems, Ltd. here.

During a recent visit to the U.S., Reiter, whose firm supplies data base management systems, noted that Israel's location places the country at the doorstep of the still infant but promising computer markets in Asia and Africa. Thus, foreign vendors with Israeli production or marketing facilities will have easier access to those markets than companies without offices in the Jewish state, he concluded.

However, he could cite no specific figures. Reiter also argued that American vendors can manufacture their products more inexpensively in his country than in their own because labor costs in Israel are relatively low compared with those in the U.S. Moreover, the Israeli labor force provides an "extremely high" level of education and technical skills, he said.

"We have probably the highest proportion of university graduates in the world, even higher than in the U.S.," he claimed. "In fact, manpower and expertise are probably the only natural resources we have."

### Research Subsidies

Another factor favoring U.S. investment in Israel's computer industry, he added, is an Israeli government policy of subsidizing any domestic research and development project that ultimately results in exports. The subsidy plan applies both to foreign and indigenous firms, and, in the computer industry, affects both hardware and software suppliers, Reiter explained.

Israel's computer industry has experienced "explosive" growth since it emerged in 1954 with the development of the first Israeli-built computer. Expansion has been particularly rapid during the last five years when the rate of increase totaled an estimated 30% per year, he said.

To a great extent, the growth in the

Israeli computer industry reflects recent trends in the world DP market in general, Reiter explained. But the industry has also benefited indirectly from the continual warfare that has otherwise plagued the country since its founding about 30 years ago.

"War forced us to develop a domestic computer industry because a country can't defend itself adequately in modern times without computers," explained Reiter, who said the military provided the impetus for developing much of Israel's indigenous DP technology.

### Boost From Iran

In recent years, Israel's computer business has also gotten a boost from, of all places, the government of Iran, which has contracted for the services of Israeli firms in several fields, including the computer industry.

Thus far, the flow of trade between the two unlikely business partners has amounted to little more than a trickle. But Reiter predicts the arrangement could lead to expanded commerce.

Chances are also good, he noted, that Israel will someday open similar trade channels with Egypt - a development he said would aid both sides, especially the technology-starved Egyptians.

For the moment, however, Israel's computer industry consists primarily of a large contingent of major foreign vendors complemented by a smattering of indigenous firms. Among the foreign companies, are most of the principal U.S. hardware manufacturers,

including Intel Corp., which operates a major production plant in this city, Reiter said.

Among the native computer companies are several peripherals manufacturers and El Bit Ltd., a maker of 16-bit minicomputers, which is owned partly by Control Data Corp.

### Kibbutzim Involved

The indigenous computer industry also includes a handful of kibbutzim that make most if not all their living from DP products or services. One such high-technology kibbutz subsists entirely on the income it earns as a software house and service bureau, Reiter remarked.

For the most part, Israel remains slightly behind the U.S. in computer technology, though comparable in the state of the art to Western Europe, Reiter said. But in a few areas like computer-aided agriculture, the Israelis are probably the world leaders, he claimed.

Israel is particularly advanced in the use of computers to control crop sprinkler systems and manage resources in small agricultural units. The country also excels in computer-based medical electronics and is quickly turning that field into an export market, Reiter said.

Again as in the U.S., the defense establishment forms one of the major sectors of Israel's user population. Outside the military, the country's installed base totals about 600 computers in various industries.

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## Shenefield Says Antitrust Not Stretching Resources

By Edith Holmes

CW Washington Bureau

WASHINGTON, D.C. — Conducting massive antitrust suits like those now under way against IBM and AT&T is not stretching them the resources of the U.S. Justice Department, although some people believe these two cases are "bleeding the Antitrust Division dry," Assistant Attorney General John H. Shenefield said here recently.

Speaking at the Fifth Annual Caucus of the Computer and Communications Industry Association (CCIA), Shenefield attempted to destroy the myths and outline the status of the Justice Department's antitrust efforts in the computer and communications fields. Among the first myths he tackled was the size of the Antitrust Division's resources.

"I expect that less than 10% of the public has the foggiest idea about how big an animal the Antitrust Division actually is," he said. "For fiscal 1978, the division's vast resources consisted of about 850 employees, 420 of which were lawyers. About 650 people are located in Washington, and the rest are in our eight field offices or working on out-of-town cases."

Shenefield put the division's budget at about \$40 million — \$10 million of which is earmarked for state attorneys general as grants. The balance, \$30 million, is what the government spends to police a \$1.8 trillion economy, he said.

Except for its cases against IBM and AT&T, the Antitrust Division has the equivalent of two or three full-time employees in the Special Regulated Industries Section assigned to computer and communications matters, according to Shenefield.

"The conventional wisdom is that

these two cases are bleeding the Antitrust Division dry," he stated. Although the suits are "obviously significant matters," the resources devoted to them are surprisingly modest.

The IBM case involves 45 Justice Department employees, 25 of whom are attorneys, earning a total of \$872,000 in salaries each year. The total budget for the trial effort runs between \$2 million and \$2.5 million.

The AT&T case is about half the dimensions of IBM, with 26 employees, including eight lawyers, and a \$1 million to \$1.5 million budget.

How much are the defendants spending on defense? I doubt if anyone really knows," Shenefield stated.

## Semi Testing Revitalized

SAN JOSE, Calif. — The rapidly growing market for LSI and memory devices is revitalizing the semiconductor testing sector of the automatic test equipment (ATE) market, Prime Data found in a recent study of the semiconductor testing field.

The ATE market, which had experienced declining sales as recently as 1975, grew from a \$55.5 million industry in 1970 to \$131.5 million in 1977 and could total as much as \$260 million by 1982, Prime Data forecast.

Growth in individual market sub-segments ranges from less than 6% to almost 50%.

The two most significant market segments, according to the report, are LSI device testers and memory

testers, forecast to more than double in sales by 1982.

The ATE market for semiconductor testers is dominated by four manufacturers with combined sales representing 76% of the total in 1977, but several new companies are making successful entries into the market, the study said.

Sales to semiconductor users have "significantly" increased in market share during the last five years and now equal those of semiconductor manufacturers, Prime Data said.

The current study is the second in a two-volume analysis of the ATE market. The \$795 second volume is available from the company at Suite 203, 4000 Moore Park Ave., San Jose, Calif. 95117.

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## Adapso Planning Move to Capitol

MONTVALE, N.J. — The Association of Data Processing Service Organizations (Adapso) plans to move its executive offices to Washington, D.C., in early 1979.

The move to Washington is based on Adapso's current program that places greater emphasis on advocacy and governmental relations. Both activities, according to Jerome L. Dreyer, Adapso's executive vice-president, would best be served by relocation.

While offices have not as yet been selected, Dreyer indicated they would be situated in either downtown Washington or the adjacent suburbs. Before relocating to Montvale in 1974, the association had its executive offices in New York City.

Dreyer said the move, which has been considered for the past several years, is also a result of the association's growing commitment to issues like data and telecommunications and privacy and security.

"With our offices in Washington, we can expand our efforts in behalf of our 330 member companies with Congress, the regulatory agencies and other quasi-governmental organizations that are also headquartered in the areas," he said.

## Executive Corner

• John F. Carlson has been elected vice-president of finance for Cray Research, Inc.

• Charles L. Haycraft has been named vice-president of marketing and Rex O. Gregory has been named vice-president of operations at Azurdata, Inc.

• Benjamin F. Mathews has been appointed vice-president of finance and controller by Bowne Time Sharing.

• Anthony B. Coburn has resigned as president and chief executive officer of Computer Optics, Inc. to devote full time to finding additional sources of capital to support projected growth and product development. He will continue as chairman of the board of directors. Lawrence M. Smith was named to fill Coburn's old posts.

• At Computer Sciences Corp., Werner Schaer has been promoted to president of Computer Sciences Europe, a division of the Data Services Group; Marvin L. Pulliam has been named vice-president for applications and product development of the Group's Infonet Division; and M.R. Rusch has been promoted to vice-president for software development for the Data Services Group.

• Paul L. Bouchard has been appointed director of operations for DBA Systems, Inc.

• Donald E. Anderson was named vice-president of computer services at McDonnell Douglas Automation Co.

• Edward J. Phillippe has joined Quantum Corp. as financial vice-president.

## Micros Seen Spurring Sales In Process Control Abroad

By Jeffrey Beeler  
CW Staff

NEW YORK—Microprocessors will totally reshape the European process control market during the next eight years, Frost & Sullivan, Inc. (F&S) predicted in a newly released market study.

Entitled "The Process Control Instrumentation Market in Europe," the 234-page report forecast that the microprocessor value of European process control equipment will total \$40 million by 1981 and \$200 million by 1986.

European shipments in all categories of process control equipment totaled \$1.5 billion in 1976.

An anticipated 10% annual growth in shipments, however, will boost the market for process control equipment to \$2.5 billion in 1981 and \$3.8 billion in 1986, according to F&S.

CRT terminals will also influence hardware architecture, with future control rooms containing "many more screens than they do now," the report added.

Six countries will account for about 97% of process control equipment sales in the European Common Market and as much as 80% of the total West European market.

Of those six nations, West Germany will experience the fastest market growth with a 186% increase in process control equipment sales between 1976 and 1987, F&S predicted.

During the same period, Belgium will achieve the second greatest market increase with a sales jump of 182%, followed by France with 147%, Italy with 143%, the UK with 120% and The Netherlands with 92%, the market research firm continued.

Breaking down expected sales by equipment category, the report predicted digital systems and recording devices will experience faster growth than any other sector of the process control equipment market, with anticipated sales increases of 262% between 1976 and 1986.

Other leading categories of process control hardware will include telemetric equipment, with a projected market growth of 217%, and sensing equipment, with a 100% sales jump, F&S said.

By 1986, the power generation field will displace the chemical industry as the chief marketplace for process control equipment. Sales of the hardware for power generation applications will grow 250% during the next eight years, the study forecast.

Once identified almost exclusively with the chemical industry, the process control field will also gain additional markets in the textile, leather production and raw materials industries.

Other typical applications for process control technology will include printing, water and treatment and distribution, sewage handling and discrete manufacturing, according to F&S.

In other findings, the market report noted that "the dividing line between an electronic controller and digital system is no longer very clear," primarily because of the increasing use of minicomputers and microcomputers, programmable controllers and other intelligent instruments.

In its study, F&S described software as a "bottleneck" in the sale of process control systems.

The full report is available for \$850 from F&S, 106 Fulton St., New York, N.Y. 10038.

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All of these foreign countries are also heavy importers of U.S.-made computer products and services, with almost a billion and a quarter dollars of imports from the United States in 1976. (2)

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Notes:

(1) Measured by value, based on data from International Data Corporation, the world's leading EDP market research company. General purpose computer systems do not include minicomputers or small business systems.

(2) U.S. Commerce Department figures.

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## Orders & Installations

Newton County, Ga., has ordered a Honeywell Level 62 system to run property assessment and tax-billing applications.

Western Auto Supply Co. has ordered TRW's 2001 retail system, including more than 1,000 point-of-sale terminals. The system, valued at more than \$6 million, will be used to improve merchandise information for headquarters and store management.

Ohio Valley Data Control, Inc. of Belpre, Ohio, has ordered a Burroughs Corp. B4800 system valued at \$750,000 for on-line processing, inquiry for batch updating.

First Federal Savings and Loan Association of Annapolis, Md., has ordered

a Burroughs Corp. B1860 valued at \$300,000 to maintain 50,000 savings accounts and mortgage, home improvement, construction and participation loans as well as prepare management reports.

An order for 20 remote batch terminal systems valued at approximately \$850,000 has been awarded to Harris Corp.'s Data Communications Division by Allegheny Ludlum Industries, Inc., Pittsburgh-based producer of specialty steels and other metal products.

Midwest Advanced Computer Services, Inc. of Southfield, Mich., has ordered two Burroughs Corp. B4800 systems valued at \$2 million.

## But 11% Growth Seen Federal Constraints Hurting Spending for Medical DP

By Jeffrey Beeler  
CW Staff

WALTHAM, Mass. — Federal attempts to limit hospital spending have dealt a serious blow to the once-thriving medical electronics field. International Data Corp. (IDC) said in a recent edition of its biweekly report for the automated transaction equipment industry.

Hospitals have found sophisticated electronics hardware like computerized body scanners increasingly difficult to buy since Congress passed the National Health Planning and Resources Development Act three years ago, the market research firm said.

Enacted to help hold down the country's rapidly escalating health care costs, the law requires each state to establish a health planning board to authorize all purchases of medical equipment costing \$100,000 or more. Before a hospital can acquire such a piece of equipment, it must first submit a purchase proposal to the board for independent review. If the hospital cannot prove sufficient need for the hardware, the board can reject the application.

Unfortunately for suppliers of medical electronics equipment, the review boards have shown little reluctance thus far to exercise their veto authority, IDC reported. In fact, in the last year and a half alone, boards in 34 states have spurned 190 proposed scanner purchases worth an estimated \$50 million, and the refusal rate jumped to 35% to 40% between July 1976 and July 1977, the report added.

### Financial Pinch

Predictably, the rejection of many applications for large-scale purchases has sent sales growth in the medical electronics industry and thrown diagnostic equipment vendors particularly into psychological if not financial depression, the report noted.

London-based EMI Ltd., the leading supplier of computerized body scanners, reported its 1977 U.S. revenues fell 50% from their 1976 level, and Ohio-based Technicare, another scanner manufacturer, reported similar results during the same period.

What's more, the financial pinch could soon become even worse if Congress passes the proposed Hospital Cost Containment Act of 1977, which would strictly limit the funds the nation's acute care facilities could allocate each year for new capital expenditures. The bill already has the Carter Administration's backing and, although Congressional debate on the subject will not begin until this spring, the law still stands a reasonable chance of passing, IDC said.

Pressure to curb spending for new hardware is also being placed on the health care industry by insurance companies, the report added.

### 11% Growth Forecast

Even with the prospect of increased government and private-sector regulation, however, the medical electronics market will continue to grow an average of 11% per year at least through 1990, IDC predicted.

As if to demonstrate that spending for large-scale medical electronics systems will not succumb entirely to legis-

lative cost-cutting pressure, the Hewlett-Packard Co. recently announced it had received a \$2.5 million order for electronic patient monitoring systems. Described by an HP official as the largest domestic order of its sort ever received by the company, the shipment will go to the 1,280-bed Walter Reed Army Medical Center in Washington, D.C., IDC reported.

The order includes seven patient data management systems, six arrhythmia monitoring systems and instruments that will simultaneously collect EKG, respiration, temperature and blood pressure data for 125 patients. The shipment also includes a continuous monitoring system for 112 patients.

Quoting the findings of another market research outfit — Cleveland-based Predictics, Inc. — IDC predicted hospitals would exhibit at least three major trends in their future purchases of large-scale medical electronics systems:

- A move toward patient care systems that can both cut costs and relieve personnel shortages.

- A growing interest in increasing services rather than bedside.

- A growing tendency to regard computerized medical equipment as an institutional status symbol.

Predictics divided medical electronics equipment into three categories: diagnostic, therapeutic and monitoring, IDC continued. At present, diagnostic equipment claims more than 40% of the non-DP medical electronics market, primarily because of the rapidly growing computerized scanner sector.

By 1980, diagnostic equipment will account for \$1.2 million or almost 62% of the nearly \$2 million market, and by 1990 the share will rise slightly to more than 63% of the \$4.6 billion total, IDC forecasted.

Therapeutic equipment sales will reach \$615 million or almost 32% of the non-DP medical electronics market in 1980 and \$1.3 billion or 29% of the total in 1990, the report added.

In the monitoring equipment sector, revenues will total \$135 million or about 7% of the market in 1980. Ten years later, sales in the sector will jump to \$315 million and represent an 8% market share, IDC said.

The DP sector of the medical electronics market means that future sales of \$875 million in 1980 and \$2.6 billion in 1990, the report predicted.

Some of the products besides scanners that will spearhead sales growth in the medical electronics field will include on-line medical DP systems, electronic limbs and pain control equipment units.



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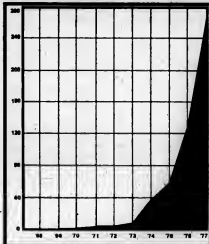
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# Engineers and Programmers



NCR's Engineering & Manufacturing Division in Millsboro, Delaware is a leader in the design and manufacture of ECR/POS intelligent terminals. Ground floor opportunities exist in the design and development of our new C-2140 multi-microprocessor retail system.

## REAL-TIME PROGRAMMERS

- Microprocessor Software (Assembly Level)
- Operating Systems Design
- I/O Drivers
- Diagnostics
- Communication Protocols (SDLC)

Other requirements include Component-Reliability Engineers and Quality Engineers. All positions require a BS in EE, CS or a related discipline.

In addition to excellent career opportunities with NCR, our Millsboro location is right in the heart of the Delmarva Peninsula, better known as the "land of Pleasant Living". We're just minutes from marine recreational areas, wildlife preserves and the nation's finest beaches, and within a 3-hour drive of such major cities as Philadelphia, Baltimore and Washington.

Please send resume with salary requirements or call:

collect, (302) 934-8111

Ron Tull, Dept. CW-313  
Engineering & Manufacturing-Millsboro  
NCR Corporation  
P.O. Box 607  
Millsboro, Delaware 19966

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## DEVELOPMENT ENGINEERS

- State-of-the-art mass memory devices and technology such as PMOS, NMOS, CMOS, MSI and LSI
- 8080 Based microprocessor design
- Multiprocessor systems architecture
- I/O devices, (wind readers, cassettes, CRTS)
- Computer controlled test systems design

# NCR

## PROGRAMMING

### Systems Applications Programmer

Will design and implement terminal-oriented applications programs. Should be experienced with high-level languages, terminal systems, and interacting terminals with host computer applications programs. BS or M.S. degree in Computer Science, Math, Information Systems, or equivalent required.

### Systems Programmer

Design and implement software on a multiple microprocessor system. Requires a good understanding of high-level languages, experience with interrupt processing and an interest in systems architecture. An appropriate bachelor's or master's degree and one to three years of applicable experience or equivalent required.

### Software Designer Senior

Opportunity to become a part of a group designing microprocessor based systems. Should be capable of providing technical leadership in the development of software tools and techniques and be interested in problems of human engineering. An advanced degree and related experience desired.

These positions within our Advanced Systems Development Organization located in Carlsbad, California, offer challenging assignments and excellent progression opportunities. Our comprehensive benefit programs include free medical and life insurance, a stock purchase plan, retirement plan, educational assistance, paid holidays, vacation plan, and sickness and accident benefits.

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In a customer environment you will be responsible for:

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Honeywell's Small/Medium Information Systems Division (S/MISD) is continuing to expand and is seeking outstanding professionals who want more challenging and rewarding careers. Based in our Billerica, Massachusetts facility, you'll be involved in the stimulating activity that the LEVEL 6's success has brought about... and contributing in an atmosphere of real accomplishment and pride. If this is what you have been looking for in your career, come to Honeywell S/MISD.

### Software Analysts

We're searching for Analysts to design and implement sophisticated software with state-of-the-art techniques in a variety of ongoing projects such as networking, communications, IBM emulators, data entry systems, compilers, interfaces, etc. You should have 2 or more years on the job experience in several of the following areas: HASP, RJE systems, multijunction environments, communications/networking and a BSEI or computer science preferred.

### Systems Engineering

The Software Systems Design Group has several immediate openings for experienced systems professionals whose responsibilities will include independent analyses of systems. You should have 5 or more years of experience in several of the following areas: definition and design of software in a distributed system environment, operating system design, data base design, communications and terminals. A BS/EE/MSEE or computer science or equivalent is desirable.

### Senior Analyst

Special SW Engineering also has several openings for experienced professionals whose responsibilities will include the translation of minicomputer software conceptual design objectives into specific subsystem parameters and requirements. You should have 8-9 years software experience with at least 3 years system level programming background, along with significant knowledge and experience related to computer system software and technology utilized in conjunction with digital communications networks linking 360/30 hosts with minicomputers and terminals.

### Software Support Analyst

We're searching for a self starter to be a key member of our team of Software Support Specialists. You will provide customer support in a distributed network architecture environment in problem analysis, technical presentations, and field interface. You should have three to five years experience with IBM communications protocols; recent experience with SNA a big plus. A degree in a related discipline is desirable. Some travel required.

### Software Product Support

Software Engineering needs professionals to support new software designs with emphasis on networking and communications environments. If you have one to three years on-the-job experience in multijunction environments, communications, networking; hold a degree in a related discipline; and are able to travel... this is a key opportunity!

### Programmers

We're searching for Programmers to design and implement sophisticated software with state-of-the-art techniques to qualify minicomputer communications networks.

Must have 1-4 years on the job software development experience with communications background highly desirable.

### Communications/Networking Systems Design

Special Engineering has openings for Software Analysts with experience in Communications and Network system design and/or software development. You will be responsible for evaluating customer requirements for Level 6 minicomputer based systems and networks; and responding to RFP's with conceptual system designs. You will also participate heavily in customer interfacing activities by providing technical support to Marketing. Particular emphasis is placed on interfacing to IBM systems.

These positions require combined hardware and software experience with at least 3 years in Communications and Networks. Experience with IBM Communications systems is desirable.

### Software/Firmware Professionals

Immediate openings exist at all levels in the design of a family of microprocessor based video terminals. Specific assignments include the design and implementation of the software/firmware for our new terminal products. This exciting work includes a close working relationship with the hardware and hardware designers.

Specific experience should include either assembly language programming with communications or microprocessor background or word processing design experience. This experience could be your key to entry into an expanding line of interactive and word processing terminals.

### Diagnostic Programmers

As a Diagnostic Programmer you will have responsibility for developing diagnostics for computer peripheral and central subsystem equipment of Honeywell's new line of mini-computers, analyzing new hardware designs and developing programs to verify operations. Opportunities exist particularly in the area of digital communications, network testing and on-line diagnostics running under an operating system.

If you are interested in any of the above positions please forward your resume, including salary history and indicating position or positions of interest, to: Blanche Hurt, HONEYWELL, SM-302, 300 Concord Road, Billerica, MA 01821.

## Hardware

Positions are also available at most levels in the following areas:

### Terminals and Communication Definition

### Minicomputer Hardware Systems

### Minicomputer Definition

### Circuit Design

### Special Products Hardware Development

If you are interested in any of the above positions please forward your resume, including salary history and indicating position or positions of interest, to: Jerry Haynesworth, HONEYWELL, SM-302, 300 Concord Road, Billerica, MA 01821.

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Our Manager, Systems and Programming, will return your call at your convenience or, if you prefer, mail your resume including salary expectations, to D.W. Shurt, National Steel & Shipbuilding Co., Harbor Dr., 28th St., P.O. Box 80278, San Diego, California 92138. We are an equal opportunity employer M/F.

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The position needs a Center providing computer support for the University of Virginia Hospital. The position holder will be responsible for the management of the hospital's computer system. Full-time staff numbers 49. The successful candidate will have an advanced degree in Computer Science or related field, and at least two years experience in computer software management, and a record demonstrating technical expertise, administrative skills, and an ability to work effectively with a wide variety of computer users, preferably in a medical environment.

Send resume stating salary requirements and names of three references by March 24 to the Director of Computing Activities, University of Virginia, P.O. Box 388, Charlottesville, VA 22903. An EEO/AA Employer.

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If unable to call, write: Source Ed, Department C3  
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Full-time, tenure track position in an expanding department. Progressive, teaching-oriented state university. Current enrollment of 8,500 students. Located in one of the most scenic parts of the U.S. Pleasant small city living. Convenient access to metropolitan areas.

Position involves undergraduate instruction and curriculum design. Masters required. Ph.D. desirable. Previous teaching and/or administrative experience helpful. Available March 24, 1978.

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Excellent opportunity for programmer/analyst with computer experience and a professional to work with a team in the development and installation of two major on-line systems. (Life Com II) (in-house group system). Life insurance experience preferred but not required.

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Excellent opportunity for programmer/analyst with 3-5 years experience in group or individual life systems for insurance. Significant effort. Experience in BAL, COBOL, CICS and DB2 desirable.

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**THE COMPANY** SDC has been the industry leader in Systems Software Development for over 20 years. We are undergoing rapid expansion due to our demonstrated technical excellence.

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## PROGRAMMER/ANALYSTS DIGITAL SYSTEMS ENGINEERS & TECHNICIANS

### Share Our Future In Space ...

Computer Sciences Corporation, with over 8,500 computer professionals, knows how to develop and reward computer expertise.

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Positions require a degree in Computer Science, Math, Physics, or Engineering with programming experience on any hardware configuration. Opportunities include design and development of real-time and non real-time telemetry communications systems, satellite command and communications systems, operating systems, distributive network systems AND design and development of hardware diagnostics for communications, operator, and data storage devices.

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Will participate in a wide range of activities from hardware installation, modifications, and diagnostic testing to analysis and resolution of software/hardware related anomalies. These technical support services are required on small and medium size mainframes, disc and drum storage units, CRT terminals, magnetic tape units, data transmission units, stored program decomputers, timing systems and other peripheral devices. We require a BSEE or technical/military school training (as applicable to the position) and 3-6 years related experience.

CSC offers an excellent benefits package including a liberal relocation policy and competitive salaries. For immediate consideration, please send resume or call:

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System Sciences Division  
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## MIS SOFTWARE DESIGN

### Staff Opening at the NCR Worldwide Headquarters in Dayton

A leading force in the data processing industry, and recognized innovators, the NCR technical team is continuing to expand. There are career opportunities with our MIS operations involving design and development of advanced communication environments, on-line data capture application interface functions, and enhancements to current processing applications. If you have a degree, plus in-depth knowledge of COBOL and experience in systems design including specification, documentation and communications, this could be the rapid-rising opportunity you've been seeking.

We offer competitive salaries, comprehensive benefits, and significant growth potential with one of the most respected firms in data processing - serving Business, Industry, Government and Education worldwide.

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**NCR**

### PROGRAMMERS

Large urban university in New York City has immediate opening for programmers in data processing center. Capabilities in COBOL, Pascal, FORTRAN required. Familiarity with DEC equipment desired. Salary competitive and commensurate with experience. Contact: Director of Administration.

Long Island University  
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### OPPORTUNITIES FOR EDP PROFESSIONALS

Our clients, located from Florida to Texas, are currently seeking highly motivated EDP professionals to assume responsible and growth positions as program analysts, project leaders and managers. New systems developments and existing systems functions are currently underway in systems laboratory, transportation, manufacturing and mini computer software.

Minimum qualification for programmer is two years of business oriented COBOL utilizing medium to large data main frame. Strong plus factors include degree, OS, CICS or IMS. Salary level range from \$15K for programmers to over \$30K management.

We are executive recruiters that specialize in the placement of EDP personnel. To candidate, all fees, relocation and interview expenses are assumed. We are to have the cold north for a health-join a progressive, dynamic corporation. Send your resume and salary history to:

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Competitive starting salaries, excellent benefits program and opportunities for career growth.

Call now or send resume to:

### MORRISON INCORPORATED

Human Resources Department  
First National Bank Building  
P.O. Box 2608  
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205/432-9711 Extenson 263

**UCC**

UNIVERSITY COMPUTING COMPANY  
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## Requires Top Computer People FOR IRELAND

Like to return home? UCC Datacom, Ireland's biggest independent Computer Service Bureau, offers just that opportunity to skilled Programmers and Analysts for its computer centres throughout IRELAND.

We need the following additional personnel to join our young enthusiastic and highly skilled team to meet the fast growing demand for our services.

### SYSTEMS ANALYSTS:

Applicants should have at least four years experience in Data processing with strong commercial background in the design and implementation of commercial systems.

### PROGRAMMERS:

With at least two years experience. Knowledge of COBOL an advantage.

### ANALYST PROGRAMMERS:

Applicants must have at least two years experience of COBOL programming.

These interesting and challenging positions in an ideal working environment offer first class salaries and generous fringe benefits.

Our Divisional Director Kevin C. Murphy will interview all applicants in the week commencing Monday, March 20, at the Industrial Development Authority offices, 200, Park Avenue, New York, NY 10017. Telephone (212) 972-1000.

Applications in writing, together with a telephone number at which you can be contacted, should be forwarded to Mr. Murphy, c/o the IDA offices, at the above address.

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Fortune 300, suburban based, internationally known manufacturing firm needs people for MIS Manager. Must have systems design background in either Manufacturing, Financial, Marketing or Communications areas. Vested duties include Special Projects Manager, Feasibility Studies, Hardware & Software Evaluations & Proposals, Large Scale to Mainframe Systems Planning & Development. Must be effective communicator oral & written. Will travel (National) consist with top level users, corp & divisions. Someone with 10 yrs experience can expect 26% increase. Plans for expansion offer exceptional career growth to serious minded, ambitious and industrious candidate. Resume not required, to discuss contact:

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### DATA PROCESSING EXECUTIVE

An established Portland, Maine area service bureau specializing in utility and municipal services, is seeking an individual who possesses successful experience in data processing management. Should also be knowledgeable in systems, programming, and marketing. This position is to carry full responsibility for the DPC Division and its expansion. Please forward resume to Mr. J.H. Hosmer, Telephone Service Commission, 1005 U.S. Route #1, Falmouth, Maine 04101.

## SOFTWARE ENGINEER PROJECT ENGINEER

Top level design people needed to design and supervise the development of real-time industrial control systems for material handling, automotive, and metals industry applications. 3-5 years experience required. Applicants should have real-time process control experience - D.E.C. or G.A. minicomputer experience desirable.

Top salary commensurate with experience, liberal benefits package, and a rural southeast Michigan location. Send resume and salary requirements in confidence to Employment Manager at:

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## Career Opportunities At



### MARKETING

Highly motivated persons are needed to represent ACS in the data center services market. Previous experience in the marketing of computer services or applications services is required. We offer an excellent compensation plan based on performance.

### SYSTEMS SUPPORT

Experienced, imaginative systems programmers are needed to support our system of multiple IBM 370/158's running under MVS multi-access pool. Challenging and rewarding work is available to persons having experience in any of the following areas: MVT/SVS/MVS, HASP/JES2, Communications, TSO.

### CUSTOMER SUPPORT

Technical support for our diversified and growing user community requires individuals who enjoy communicating with other people and staying technically current. Activities include consulting, education, conversions, benchmarks, troubleshooting, demonstrations, and program product support. At least two years experience in IBM OS/VS JCL and Utilities, and FORTRAN, COBOL, or PL/I is required. Experience in using TSO is a big plus.

### COMPUTER OPERATIONS

Experienced computer operators are needed to operate our expanding computer center. Experience in an IBM 370 environment, operating under OS/VS or MVS, is required. Experience with an MP370/158 configuration is a definite plus. Work is available on all shifts.

### TECHNICAL WRITING

Technical writers are needed to write and publish our user guides, newsletters, and technical updates. Positions require at least two years experience in technical writing, including writing in support of computer software. Experience using an IBM 370 system, especially programming experience, would be helpful.

Avco Computer Services is one of the largest and fastest growing computer centers in New England. Located in a pleasant suburban area north of Boston, we supply data center services to clients throughout the United States. Our operation is based on a very large IBM 370 computer system. Expansion of our business is creating new opportunities for data processing professionals to engage in challenging and rewarding work in these areas:

### GRAPHICS SUPPORT

ACS has recently upgraded to an Information International FR80 Graphics COM System and is seeking both FR80 system support and customer support personnel. ACS will provide FR80 training. At least two years experience in FORTRAN and graphics programming, preferably on an IBM system for drum or CRT plotters, is required. Programming experience in DISPLA, Calcomp, and minicomputer software is a definite plus.

### APPLICATION SYSTEMS

Applications analysts and programmers are needed to assist our users in applying data processing technology to specific problems. Working in teams, these persons will design, develop, and maintain application systems built to individual user specifications. Opportunities are open to middle and senior level systems analysts and programmer/analysts. Must have at least two years experience in business management applications implemented in COBOL or MARK IV and operating in an IBM 370 OS/VS environment. Experience in interactive or TSO batch applications and in FORTRAN applications is a plus. Some positions require travel.

### ADMINISTRATIVE PROCEDURES

Our expanding business requires an experienced procedures analyst to assist ACS management in organizing and controlling our internal workflow. At least two years experience in procedures and forms design and implementation is required.

Avco offers a liberal benefit program, including aid for advanced education, and excellent salary commensurate with your educational and professional background.

Kindly send your resume including salary requirements to:  
Mr. Peter C. Dowd, Employment Supervisor



201 Lowell Street, Warrington, Massachusetts 01867  
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Employment Manager  
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Requires MS or PhD/ChE, other engineering discipline or physical science. Experience in nonlinear process dynamics modeling using digital computers and conservation laws a must. Will supervise construction of power plant models and other processes using conservation laws, and then simulate these processes on a digital computer.

## RESEARCH SPECIALIST

Real-time software systems for control

Requires MS or PhD/EE or Computer Science. At least 5 years experience in real-time software systems for process control desired. PhD background would be an asset. Position interfaces with personnel throughout the company and will be charged with planning, conducting and evaluating process control programs using advanced software and systems technology.

## RESEARCH ENGINEER

Requires MS in EE or Computer Science. Graduates interested in working with sophisticated software technology would be considered. Will be responsible for data acquisition, reduction and display programs to support on-going experiments. Must be familiar with FORTRAN, BASIC and HP Assembly languages.

Please rush credentials stating current salary and specific position of interest to: Mr. L.B. Comp. Ref. 317.

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Candidate should have 5 to 10 years of sales/marketing experience, including at least 2 years of sales management in the OEM computer peripheral, CRT or minicomputer industry.

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Candidates should have a minimum of 5 years experience including 2 or more years selling data entry, computer peripheral, or related equipment to OEM's.

### SYSTEMS ENGINEERS

Candidates should have at least 5 years experience as an analyst, including 2 or more in telecommunications. Additional background in intelligent data entry and commercial applications desirable.

For prompt and confidential consideration, please submit resume including salary requirements, or call:

Personnel Department (516) 231-5400

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Educational experience desired, Glendale, Arizona Elementary School, 5724 W. Glendale Ave., Glendale, Ariz. 85303 c/o Personnel Service, (602) 931-9311, Mr. Pothman.

## ANNOUNCEMENT OF VACANCY

The Center for Technology and Administration of The American University seeks to fill one faculty position in the Department of Systems Applications. Faculty member will be responsible for teaching and research.

The Center is one of the few multi-disciplinary academic units in the United States which has a permanent faculty and offers degrees in both the Bachelor's and Master's levels. Programs are presently offered in six areas: Computer Systems Applications, Management Information Systems, Systems Applications, Faculty member will be responsible for teaching and research. The Center is one of the few multi-disciplinary academic units in the United States which has a permanent faculty and offers degrees in both the Bachelor's and Master's levels. Programs are presently offered in six areas: Computer Systems Applications, Management Information Systems, Systems Applications, Faculty member will be responsible for teaching and research.

Rank and salary will be dependent upon qualifications. The American University is an equal opportunity/affirmative action employer. Candidates should send resume and April 15, 1978 to: Dr. J. Edgar, Jr., Director, Center for Technology and Administration, The American University, Washington, D.C. 20016 (202) 681-2173

## SHELL OIL COMPANY TECHNICAL APPLICATIONS PROGRAMMING

Shell is expanding its Technical Applications Programming (TAP) department and currently has several openings for applications oriented professionals. TAP is housed in the modern Shell Information Center near the Houston Astrodone and supports Shell operations throughout the country.

Excellent career opportunities exist for both new graduates and experienced programmers/analysts. In addition to competitive salary and benefits, Shell offers:

- Primarily short term projects with total project responsibility
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- Extensive data processing education available in-house.

All candidates must meet the following requirements:

#### Education

- Bachelor's or Master's degree in Computer Science or
- Bachelor's degree in Chemical or Electrical Engineering, Math or
- MBA with one of the above undergraduate degrees.

#### Experience/Interest

- 0-5 years' technical programming language experience
- Strong interest in Computing
- Good academic/job performance record.

Please send resume and college transcripts to:

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## DEC 10

The Midwest corporate headquarters of a multi-billion dollar financial institution is awaiting the arrival of a DEC System KL-10. To fully utilize the vast capabilities of this PDP 10 equipment, several highly analytical experienced systems analyst/programmers are needed to develop and work within this time sharing environment. As these positions are responsible to the Controller Department, typical projects would relate directly to annual statements, work force analysis, corporate planning and budget analysis and general financial applications.

Qualified candidates should possess demonstrated success with time sharing applications of a highly technical nature. Strong conceptual and analytical skills are also required, as each individual will handle projects from construction design through final test stages. The ability to program in Fortran coupled with good interpersonal skills will qualify you for this position. Previous time sharing experience with exposure to DEC equipment and knowledge of interactive plotting devices is also preferred.

For immediate consideration, please send your resume to:

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## Electrical Engineers

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**Data Communication Specialist** - BS/BSEE and some experience in the design of advanced data communications, including high speed modems, multiplexers, intelligent network processors, asynchronous data link control (SDLC).

**Process Control Engineers** - Degree in Engineering with background in Computer Sciences, 3-5 years of experience in the Application of Process Control Computers within the Petrochemical, Chemical, Pulp and Paper or Textile Industries.

**Test Equipment Design Engineers** - BSEE with Digital Design experience in developing prototype digital test equipment within a Systems Environment.

**Digital Logic & Circuit Design Engineers** - BSEE and some experience in Logic & Circuit Design, including a familiarity with DDT, TTL, CMOS, etc.

**Computer Architects** - BS/MSEE and 3-5 years of experience in the definition and development of minicomputer Systems. Will be a principal participant in developing a new family of computer systems.

**Sr. Power Supply Design Engineers** - BSEE and 3-5 years of Design and Development of regulated and non-regulated power supplies. The applicant of this work will be to build an in-house capability within a systems organization.

**OEM Evaluation Engineer** - BSEE and 3-5 years of experience within design and development organization. Will evaluate major OEM peripherals such as disks, tapes, printers, etc.

**Microprocessor Design Engineer** - BS/MSEE with detailed hardware and software background. Position entails logic design simulation and prototyping.

Contact: Robert Norton

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## MANAGER TECHNICAL SERVICES

A challenging career opportunity exists for an individual to manage the technical services unit of an established information systems dept. This position is located at our corp. data center and would include company paid relocation to our So. Calif. location.

Experience required

Data Base Analysts 3 to 5 years with IMS/VS, Systems Software Sysgen and maintenance. Degree in science or math preferred. Excellent company benefits. Please send resume and salary history to director of personnel.

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The Federal Computer Performance Evaluation and Simulation Project (FEDSIM) is seeking both entry-level and experienced CPE analysts. FEDSIM provides consulting services to other Federal agencies in such areas as:

- Evaluating the performance of hardware configurations, operating systems, application programs, database management, and communications systems. Applicants for these positions should have detailed experience in systems and programs with such systems as IMS, EXEC-8 and GCDS and must have an understanding of both computer and computer technology.
- Assessing the operational efficiency, management practices, and organizational effectiveness of data processing installations. Applicants for these positions should have extensive ECP management, ECP analysis, or ECP management consulting.
- Performing capacity planning studies, which include workload requirements analysis, benchmarking, communications network design and evaluation, and providing ADP procurement assistance in such areas as benchmark data, specifications, development, proposal evaluation and lifecycle planning. Applicants for these positions should be knowledgeable in hardware and software evaluation and with computer and/or communications system modeling techniques.
- Assessing the design and predicting the performance of special purpose computer systems, and analyzing the overall performance of complex systems that contain computers as integral subsystems. Applicants for these positions should be knowledgeable in operations, maintenance, computer operating systems, and discrete-event simulation languages.

Salaries range from \$19,000 to \$30,750 with excellent opportunity for management responsibility. Advancement opportunities. Send resume of qualifications and salary history to:

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Computing Site

MIT's Information Processing Service (IPS) has a position available for a Senior Programming Analyst to manage the Remote Computing Facility (RCF). Responsibilities include: operational management of a PRIME 360, in RJE station, and a terminal room; evaluation and planning of RCF needs; liaison between RCF users and IPS; provision of user services with emphasis on statistics modeling, simulation, and econometrics; and supervision of staff. Candidates must have a combination of education and experience in computer science or a related field, and at least 5 years experience in computer programming or applications, including consulting experience and extensive use of large-scale computer systems. Demonstration of excellence in written and oral communication, and interpersonal interests and ability are essential. Please submit resume with salary history to: MIT Personnel Office, 400 Main St., Cambridge, MA 02139. Attention: Job No. 47733. An equal opportunity/affirmative action employer.

## SYSTEMS & PROGRAMMING

### MANAGER

National Corporation seeks an experienced Manager for Systems Programming Manager for San Diego Branch. Requirements: 10-15 years programming with COBOL, BASIC, FORTRAN, and PL/I. In online environment, and data base management systems. Qualifications: 2 years' experience in developing and managing application development and testing, and systems development. Overall systems development responsibilities. Salary commensurate with experience.

Send complete resume indicating previous work history, reasons for job changes, wages, benefits and present requirements to: Computer World, 434 Highway Blvd., Ste. 9, Los Angeles, CA 90024.

## PROGRAMMERS

We need several information systems professionals to help us develop a new generation of systems. The basic hardware/software configuration is IBM 370/138, DOS/VS, POWER, CICS, DLI/VSAM, SPM II, Assembler and COBOL. Our management approach is people-oriented with a strong emphasis on planning for continued growth in a wide range of medical and financial applications. Successful candidates for these programming positions will perform a complete scope of program development activities including logic design, instruction coding, documentation, program testing and user education.

We will select individuals based on employment background, work experience and education. Minimum qualifications include an Associates degree and 2 years experience. Contact:



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## Computer Systems Specialists

Lockheed announces challenging career opportunities for qualified computer specialists in areas of hardware evaluation, planning, performance and systems software.

### Hardware Systems Specialists

Qualified individuals will assume high level positions having direct interface with senior company management. Candidates should have a B.S. degree, at least five years in data processing experience, and knowledge of hardware/software systems. Individuals will perform evaluations, direct planning efforts, and manage the performance of current and future computing equipment for the company. Experience with IBM equipment, minicomputers, peripheral hardware, distributed systems, and data communications is desirable. For further information, call Dick South collect at (213) 847-6121.

### Software Systems Specialists

You will be a member of a team maintaining the MVS operating system for two IBM 370-168's which support more than two hundred on-line terminals under IMS/VS, TSO, RJE and interactive graphics. The organization is moving rapidly this year into distributed processing with terminals attached to minicomputers in turn attached to the host 370. IBM 3850 Mass Storage and 3380's are already installed. Candidates should have at least five years experience in systems, installing PTF's, problem diagnosis, and assembly language coding. Most recent experience should be with MVS and prior experience with MVT. Degree in Computer Science is preferred. For further information, call Duane Bickel collect at (213) 847-6121.

These positions command excellent salaries and fringe benefits including savings, medical and dental plans. Please write or send resumes to Bill McVede, Lockheed Employment Office, P.O. Box 551, Burbank, CA 91520.

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# ALL THE JOBS ARE HERE!

The Computer Systems Division of Harris Corporation is perhaps the fastest growing division within our Fortune 500 company. New Divisional Headquarters are in the process of being built in the highly desirable Fort Lauderdale location where we are now situated. Most of the positions listed below will be situated in Florida, where the cost of living and the climate, as well as avocational activities are highly desirable.

## SENIOR SOFTWARE ENGINEER

Due to the rapid introduction and sale of our S-100, S-200 Computer System, which incorporates the VULCAN multi-purpose virtual operating system, our Quality Assurance group has established this new growth position. The individual we seek must have a BS or MS degree in Computer Science or math and a minimum of 5 years' solid experience in operating systems coupled with some in-depth exposure to compilers. Language capabilities should include a minimum of Assembly, FORTRAN and COBOL. In addition, communications skills, both verbal and written, will be necessary. Functional responsibilities include: establishment of Quality Assurance tests with appropriate documentation and advance planning for continuous software testing. In accomplishing these tasks, vertical and lateral communication with key management personnel will be expected. Software oriented individuals with familiarity with CPU's and Operating Systems from CDC, I.P., DEC, UNIVAC, end/or IBM will help in determining specific needs.

## FIELD MARKETING ANALYSTS

The individuals we seek will have broad exposure for pre and post analyst field support. We provide experienced systems personnel having backgrounds with Honeywell, UNIVAC, Control Data, IBM, or RCA mainframe exposure. Experience in FORTRAN and COBOL with a solid grasp of operating systems will be helpful in aiding our customer revenue base. This position is the result of a solid product line and competitive expansion in the data processing community. Individuals seeking a company with a future in the data processing community should consider HARRIS. We prefer degreed individuals with 3+ years' experience in the field. Several positions are available throughout the United States, including Florida.

## SENIOR ANALYSTS

Several positions are available in addition to field marketing which includes the following areas: software development, including the development of systems software, the development of high level compilers and implementation of software product plans and marketing strategies. MIS - includes programming responsibilities which involve implementation of a comprehensive marketing forecast system and system design. This will assist with the development of the front-end order entry system.

## SENIOR FIELD SERVICE ENGINEERS

Several positions are now available throughout the United States and parts of Canada for experienced individuals having a minimum 2-5 years' in large to medium scale computer systems. Hardware and software knowledge, as well as installation, trouble shooting, maintenance and repair on peripheral hardware necessary. The most successful candidate will come from CDC, UNIVAC, Honeywell, IBM, DEC or HP.

## SENIOR DESIGN ENGINEERS

Two positions exist at our Fort Lauderdale location in the Computer Systems Engineering Department. The first position involves peripheral systems and will be responsible for the development of magnetic tapes and disc storage systems, including the specification and design of system controllers, evaluation and selection of existing OEM products and advanced product planning. Additional responsibilities include project scheduling, budgeting and supervision of technicians.

The second position involves computer terminals and the development of computer terminal systems as they would relate to CPU's and teleprinters, including terminal systems and subsystem logic design. Also, advance product planning, project scheduling and budgeting, as well as supervision of development technicians.

Both of the above positions require a Bachelor's degree in electrical engineering with 3-6 years' experience for peripheral systems and 2-5 years' experience in the case of computer terminals.

## LOGIC DESIGN ENGINEERS

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## SAN FRANCISCO OPPORTUNITY FOR PROGRAMMER ANALYSTS LARGE SCALE OAL PROCESSOR SYSTEMS B 6817 - BURROUGHS LARGE SCALE OAL MINI COMPUTERS (2) DEC PP 11/70

PLUS A TERMINAL NETWORK CONSISTING OF L.S. ADM 2's & 3's, ASR 28's, TO 3500, TO 3800, IBM 34, ASR 35's, TO 500, DATA 100's.

We are seeking two individuals to make significant contributions to the continuing development of our on-line transportation oriented applications which encompass operations throughout the U.S. and Canada.

8867 position requires a minimum of 2 years programming using COBOL and some system design experience.

PDP-11 position requires a minimum of 2 years programming using BASIC + and a working knowledge of RTS-E.

Starting salary from \$18K to \$20K depending upon experience. Outstanding fringe benefit program includes fully paid medical insurance, relocation allowance for those who qualify.

Send Resume to:

Personnel Officer  
**WESTERN PACIFIC  
RAILROAD COMPANY**  
528 Mission St.  
San Francisco, CA 94105  
An Equal Opportunity Employer M/F



## SOUTHERN CALIFORNIA DATA PROCESSING OPPORTUNITIES

Our client, one of the nation's largest restaurant chains, currently has openings in the following area:

### SYSTEMS PROGRAMMERS:

Qualified candidates will have two to three years' experience as systems programmers with DEC-10 operating systems (TOPS). Must have responsibility for operating systems design and maintenance as well as vendor and user interface. Supervisory potential. Salary \$20K-24K.

### NETWORK DATA COMMUNICATIONS SPECIALIST:

This position is responsible for maintaining a stable and efficient data communications network. Tasks include: monitor network performance, and handle vendor interface. Candidates must have two to three years' experience in the following areas: hardware/software evaluations, data communications, troubleshooting operating system bugs, and hardware vendor interface. DEC-10 experience is a big plus. Salary \$18K-22K.

### DATA BASE PROGRAMMER/ANALYST:

A staff position responsible for assisting the Data Base Administrator and dealing with the integrity, security and performance of all data bases. Will also provide support in the analysis, design and implementation of data base. Qualified candidates will be highly motivated individuals with three years' commercial data communications skills. Salary \$16K-20K.

Client will pay complete relocation expenses. Excellent fringe benefits.

We are consultants to management. If you wish to join a rapidly-growing, professional organization, please send resume and salary history in confidence to Consultant, CW Box 1486, 787 Washington St., Newton, MA 02160.

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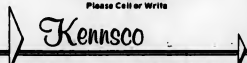
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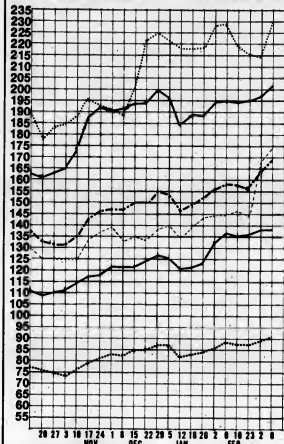
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ICD-1014, ICD-1015, ICD-1016, ICD-1017, ICD-1018, ICD-1019, ICD-1020, ICD-1021, ICD-1022, ICD-1023, ICD-1024, ICD-1025, ICD-1026, ICD-1027, ICD-1028, ICD-1029, ICD-1030, ICD-1031, ICD-1032, ICD-1033, ICD-1034, ICD-1035, ICD-1036, ICD-1037, ICD-1038, ICD-1039, ICD-1040, ICD-1041, ICD-1042, ICD-1043, ICD-1044, ICD-1045, ICD-1046, ICD-1047, ICD-1048, ICD-1049, ICD-1050, ICD-1051, ICD-1052, ICD-1053, ICD-1054, ICD-1055, ICD-1056, ICD-1057, ICD-1058, ICD-1059, ICD-1060, ICD-1061, ICD-1062, ICD-1063, ICD-1064, ICD-1065, ICD-1066, ICD-1067, ICD-1068, ICD-1069, ICD-1070, ICD-1071, ICD-1072, ICD-1073, ICD-1074, ICD-1075, ICD-1076, ICD-1077, ICD-1078, ICD-1079, ICD-1080, ICD-1081, ICD-1082, ICD-1083, ICD-1084, ICD-1085, ICD-1086, ICD-1087, ICD-1088, ICD-1089, ICD-1090, ICD-1091, ICD-1092, ICD-1093, ICD-1094, ICD-1095, ICD-1096, ICD-1097, ICD-1098, ICD-1099, ICD-1100, ICD-1101, ICD-1102, ICD-1103, ICD-1104, ICD-1105, ICD-1106, ICD-1107, ICD-1108, ICD-1109, ICD-1110, ICD-1111, ICD-1112, ICD-1113, 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# COMPUTERWORLD Computer Stocks Trading Indexes

Computer Systems — Software & EDP Services  
Peripherals & Subsystems — Leasing Companies  
Supplies & Accessories — CW Composite Index



## Earnings Reports

### HOWELL

Year Ended Dec. 31

|              | 1977      | 1978      |
|--------------|-----------|-----------|
| Shr Earnings | 95.80     | 85.50     |
| Revenue      | 2,811,000 | 2,488,200 |
| Tax Credit   | 10,813    | 7,784     |
| Earnings     | 145,194   | 115,000   |
| 3 Mo Shr     | 2.32      | 2.07      |
| Revenue      | 730,000   | 730,000   |
| Tax Credit   | 2,095     | 3,174     |
| Earnings     | 45,588    | 45,186    |

a-Includes \$12 million gain from sale of part of interest in Honeywell Bull.

### COMPUTER PRODUCTS

Year Ended Dec. 31

|              | 1977    | 1978      |
|--------------|---------|-----------|
| Shr Earnings | 5.55    | 5.31      |
| Revenue      | 6,500   | 6,153,000 |
| Earnings     | 865,000 | 865,000   |

a-Adjusted for November 1977 20% stock dividend.

### ELECTRONIC ARTISTS

Year Ended Dec. 31

|              | 1977       | 1978        |
|--------------|------------|-------------|
| Shr Earnings | 3.02       | 3.02        |
| Revenue      | 26,431,000 | \$2,678,000 |
| Operating    | 1,454,000  | 1,454,000   |
| Tax Credit   | 34,000     | 190,000     |
| Earnings     | 48,000     | (5,940,000) |
| 3 Mo Shr     | 3.02       | 3.02        |
| Revenue      | 9,274,000  | 3,771,000   |
| Earnings     | 1,028,000  | (2,944,000) |

a-Represents elimination of losses prior to loss provisions.

### MEDICAL COMPUTER SYSTEMS

Year Ended Dec. 31

|              | 1977       | 1978      |
|--------------|------------|-----------|
| Shr Earnings | 5.43       | 5.41      |
| Revenue      | 10,428,000 | 8,252,204 |
| Earnings     | 1,176,777  | 1,172,079 |
| 3 Mo Shr     | 5.43       | 5.41      |
| Revenue      | 2,705,145  | 2,453,647 |
| Earnings     | 326,787    | 303,180   |

### NATIONAL DATA COMMUNICATIONS

Year Ended Dec. 31

|              | 1977        | 1978        |
|--------------|-------------|-------------|
| Shr Earnings | \$3,281.101 | \$3,277.527 |
| Tax Credit   | 46,822      | 46,822      |
| Earnings     | (315,842)   | 46,822      |

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## Computerworld Stock Trading Summary

CLOSING PRICES: MARCH 8, 1978

| PRICE                  |            |            |         |      |      |        |      |   |            |               |       |        | PRICE  |      |     |      |         |            |        |        |      |       |  |         |      | PRICE |       |  |  |  |         |      |      |       |  |  |  |  |
|------------------------|------------|------------|---------|------|------|--------|------|---|------------|---------------|-------|--------|--------|------|-----|------|---------|------------|--------|--------|------|-------|--|---------|------|-------|-------|--|--|--|---------|------|------|-------|--|--|--|--|
|                        |            |            | 1977-78 | CLOS | WEEK | NET    |      |   |            | 1977-78       | CLOS  | WEEK   | NET    |      |     |      | 1977-78 | CLOS       | WEEK   | NET    |      |       |  | 1977-78 | CLOS | WEEK  | NET   |  |  |  | 1977-78 | CLOS | WEEK | NET   |  |  |  |  |
|                        |            |            | RANGE   | 111  | 1978 | CHNGE  |      |   |            | RANGE         | 111   | 1978   | CHNGE  |      |     |      | RANGE   | 111        | 1978   | CHNGE  |      |       |  | RANGE   | 111  | 1978  | CHNGE |  |  |  | RANGE   | 111  | 1978 | CHNGE |  |  |  |  |
| COMPUTER SYSTEMS       |            |            |         |      |      |        |      |   |            |               |       |        |        |      |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| A                      | AMNHC      | COMP       | 22-95   | 46   | 3/4  | +1/8   | -0.2 | C | ATVAC      | CLW           | TECH  | 0-2    | 1 1/2  | 0    | 0.0 | D    | DATA    | ACQUIS     | 6-5    | 5 1/4  | +5/8 | +18.7 |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| B                      | BROADCOM   | COMP       | 35-93   | 61   | 3/4  | +1 3/4 | +2.3 | C | ANALOG     | TECH          | 7-12  | 12 1/8 | +1     | +2.4 | D   | DATA | PROD    | 8-11       | 10 1/2 | +3/8   | +3.7 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| C                      | COMPUTER   | AUTOMATION | 18-30   | 24   | 1/8  | 0      | 0.0  | C | APPLIED    | DATA          | RES   | 5-12   | 9 1/8  | 3    | 0.0 | D    | DATA    | TECHNOLOGY | 9-19   | 19 1/4 | +1/4 | +12.4 |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| D                      | CONTROL    | DATA       | 10-29   | 24   | 1/8  | 0      | 0.0  | C | ASTRO      | TECH          | 23-26 | 24 1/2 | +1 1/2 | +1.0 | D   | DATA | INT     | 3-5        | 4 1/4  | +1/8   | +3.1 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| E                      | CRAY       | RESEARCH   | 35-11   | 35   | 3/4  | 0      | 0.0  | C | CALIFORNIA | AMERICAN      | CO    | 2-2    | 1 1/8  | 0    | 0.0 | D    | DATA    | TECH       | 1-3    | 2 1/2  | -1/4 | -9.0  |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| F                      | DATACOM    | COMP       | 10-29   | 24   | 1/8  | 0      | 0.0  | C | CHRON      | TECH          | 1-5   | 2 1/2  | 0      | 0.0  | D   | DATA | TECH    | 1-3        | 2 1/2  | -1/4   | -9.0 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| G                      | DIGITAL    | EQUIPMENT  | 18-41   | 34   | 3/8  | +1/2   | +1.1 | C | COMPUTER   | TECH          | 1-5   | 2 1/2  | 0      | 0.0  | D   | DATA | TECH    | 1-3        | 2 1/2  | -1/4   | -9.0 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| H                      | ELECTRONIC | ARTISTS    | 17-55   | 46   | 1/2  | 0      | 0.0  | C | COMPUTER   | TECH          | 1-5   | 2 1/2  | 0      | 0.0  | D   | DATA | TECH    | 1-3        | 2 1/2  | -1/4   | -9.0 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| I                      | ELECTRONIC | ASSOCIATES | 18-41   | 34   | 3/8  | +1/2   | +1.1 | C | COMPUTER   | TECH          | 1-5   | 2 1/2  | 0      | 0.0  | D   | DATA | TECH    | 1-3        | 2 1/2  | -1/4   | -9.0 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| J                      | GENERAL    | SYSTEMS    | 13-25   | 21   | 3/4  | +1/4   | +1.1 | C | COMPUTER   | TECH          | 1-5   | 2 1/2  | 0      | 0.0  | D   | DATA | TECH    | 1-3        | 2 1/2  | -1/4   | -9.0 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| K                      | GENERAL    | SYSTEMS    | 13-25   | 21   | 3/4  | +1/4   | +1.1 | C | COMPUTER   | TECH          | 1-5   | 2 1/2  | 0      | 0.0  | D   | DATA | TECH    | 1-3        | 2 1/2  | -1/4   | -9.0 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| L                      | GENERAL    | SYSTEMS    | 13-25   | 21   | 3/4  | +1/4   | +1.1 | C | COMPUTER   | TECH          | 1-5   | 2 1/2  | 0      | 0.0  | D   | DATA | TECH    | 1-3        | 2 1/2  | -1/4   | -9.0 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| M                      | GENERAL    | SYSTEMS    | 13-25   | 21   | 3/4  | +1/4   | +1.1 | C | COMPUTER   | TECH          | 1-5   | 2 1/2  | 0      | 0.0  | D   | DATA | TECH    | 1-3        | 2 1/2  | -1/4   | -9.0 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| N                      | GENERAL    | SYSTEMS    | 13-25   | 21   | 3/4  | +1/4   | +1.1 | C | COMPUTER   | TECH          | 1-5   | 2 1/2  | 0      | 0.0  | D   | DATA | TECH    | 1-3        | 2 1/2  | -1/4   | -9.0 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| O                      | GENERAL    | SYSTEMS    | 13-25   | 21   | 3/4  | +1/4   | +1.1 | C | COMPUTER   | TECH          | 1-5   | 2 1/2  | 0      | 0.0  | D   | DATA | TECH    | 1-3        | 2 1/2  | -1/4   | -9.0 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| P                      | GENERAL    | SYSTEMS    | 13-25   | 21   | 3/4  | +1/4   | +1.1 | C | COMPUTER   | TECH          | 1-5   | 2 1/2  | 0      | 0.0  | D   | DATA | TECH    | 1-3        | 2 1/2  | -1/4   | -9.0 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| Q                      | GENERAL    | SYSTEMS    | 13-25   | 21   | 3/4  | +1/4   | +1.1 | C | COMPUTER   | TECH          | 1-5   | 2 1/2  | 0      | 0.0  | D   | DATA | TECH    | 1-3        | 2 1/2  | -1/4   | -9.0 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| R                      | GENERAL    | SYSTEMS    | 13-25   | 21   | 3/4  | +1/4   | +1.1 | C | COMPUTER   | TECH          | 1-5   | 2 1/2  | 0      | 0.0  | D   | DATA | TECH    | 1-3        | 2 1/2  | -1/4   | -9.0 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| S                      | GENERAL    | SYSTEMS    | 13-25   | 21   | 3/4  | +1/4   | +1.1 | C | COMPUTER   | TECH          | 1-5   | 2 1/2  | 0      | 0.0  | D   | DATA | TECH    | 1-3        | 2 1/2  | -1/4   | -9.0 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| T                      | GENERAL    | SYSTEMS    | 13-25   | 21   | 3/4  | +1/4   | +1.1 | C | COMPUTER   | TECH          | 1-5   | 2 1/2  | 0      | 0.0  | D   | DATA | TECH    | 1-3        | 2 1/2  | -1/4   | -9.0 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| U                      | GENERAL    | SYSTEMS    | 13-25   | 21   | 3/4  | +1/4   | +1.1 | C | COMPUTER   | TECH          | 1-5   | 2 1/2  | 0      | 0.0  | D   | DATA | TECH    | 1-3        | 2 1/2  | -1/4   | -9.0 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| V                      | GENERAL    | SYSTEMS    | 13-25   | 21   | 3/4  | +1/4   | +1.1 | C | COMPUTER   | TECH          | 1-5   | 2 1/2  | 0      | 0.0  | D   | DATA | TECH    | 1-3        | 2 1/2  | -1/4   | -9.0 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| W                      | GENERAL    | SYSTEMS    | 13-25   | 21   | 3/4  | +1/4   | +1.1 | C | COMPUTER   | TECH          | 1-5   | 2 1/2  | 0      | 0.0  | D   | DATA | TECH    | 1-3        | 2 1/2  | -1/4   | -9.0 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| X                      | GENERAL    | SYSTEMS    | 13-25   | 21   | 3/4  | +1/4   | +1.1 | C | COMPUTER   | TECH          | 1-5   | 2 1/2  | 0      | 0.0  | D   | DATA | TECH    | 1-3        | 2 1/2  | -1/4   | -9.0 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| Y                      | GENERAL    | SYSTEMS    | 13-25   | 21   | 3/4  | +1/4   | +1.1 | C | COMPUTER   | TECH          | 1-5   | 2 1/2  | 0      | 0.0  | D   | DATA | TECH    | 1-3        | 2 1/2  | -1/4   | -9.0 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| Z                      | GENERAL    | SYSTEMS    | 13-25   | 21   | 3/4  | +1/4   | +1.1 | C | COMPUTER   | TECH          | 1-5   | 2 1/2  | 0      | 0.0  | D   | DATA | TECH    | 1-3        | 2 1/2  | -1/4   | -9.0 |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| LEASING COMPANIES      |            |            |         |      |      |        |      |   |            |               |       |        |        |      |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| A                      | ALANTONIC  | COMP       | 3-6     | 4    | 3/4  | 0      | 0.0  | N | ADPAC      | ISCOGRAPH-NUT | 10-18 | 17 1/8 | +1 1/8 | +4.8 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| B                      | BROADCOM   | COMP       | 8-16    | 16   | 1/2  | +1/8   | +0.8 | N | ADVANCED   | TECH          | 10-18 | 17 1/8 | +1 1/8 | +4.8 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| C                      | COMPUTER   | GROUP      | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| D                      | DATA       | TECHNOLOGY | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| E                      | DYNAMIC    | RENTAL     | 6-12    | 12   | 1/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| F                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| G                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| H                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| I                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| J                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| K                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| L                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| M                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| N                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| O                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| P                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| Q                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| R                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| S                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| T                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| U                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| V                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| W                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| X                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| Y                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| Z                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMER       | COMP          | 8-12  | 14 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| SUPPLIES & ACCESSORIES |            |            |         |      |      |        |      |   |            |               |       |        |        |      |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| A                      | AMERICAN   | PROD       | 6-12    | 12   | 1/4  | 0      | 0.0  | N | AMERICAN   | PROD          | 6-12  | 12 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| B                      | BROADCOM   | COMP       | 8-16    | 16   | 1/2  | +1/8   | +0.8 | N | AMERICAN   | PROD          | 6-12  | 12 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| C                      | COMPUTER   | GROUP      | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMERICAN   | PROD          | 6-12  | 12 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| D                      | DATA       | TECHNOLOGY | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMERICAN   | PROD          | 6-12  | 12 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| E                      | DYNAMIC    | RENTAL     | 6-12    | 12   | 1/4  | 0      | 0.0  | N | AMERICAN   | PROD          | 6-12  | 12 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| F                      | GENERAL    | SYSTEMS    | 3-6     | 4    | 3/4  | 0      | 0.0  | N | AMERICAN   | PROD          | 6-12  | 12 1/4 | +1 1/4 | +4.0 |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |
| G                      | GENERAL    |            |         |      |      |        |      |   |            |               |       |        |        |      |     |      |         |            |        |        |      |       |  |         |      |       |       |  |  |  |         |      |      |       |  |  |  |  |

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